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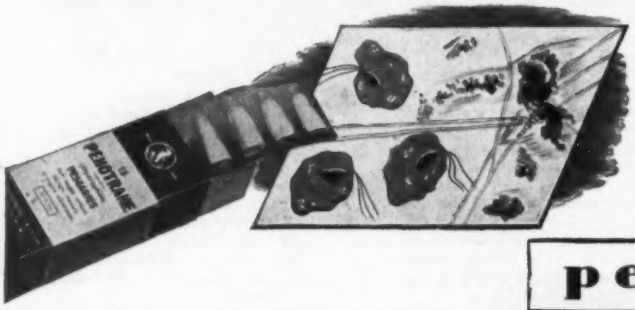

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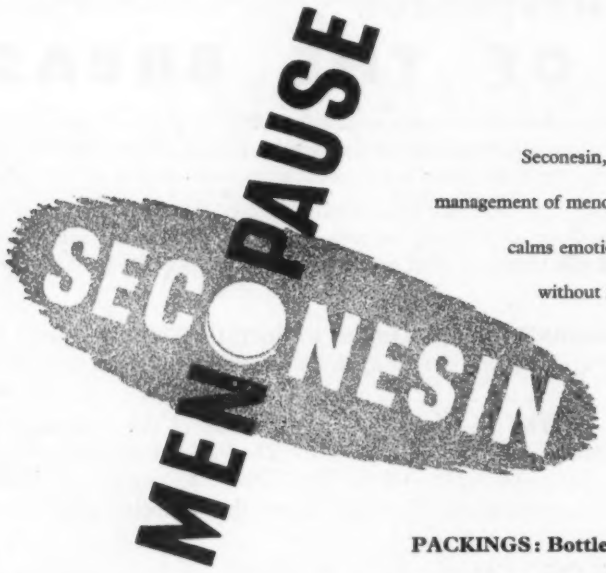

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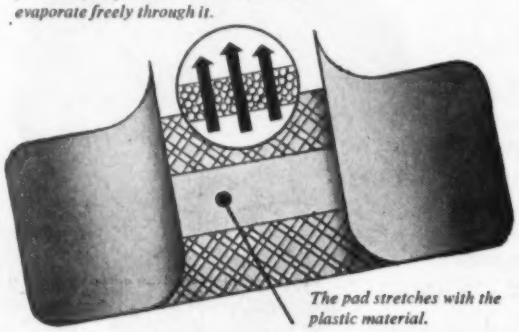

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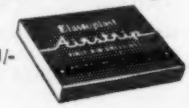

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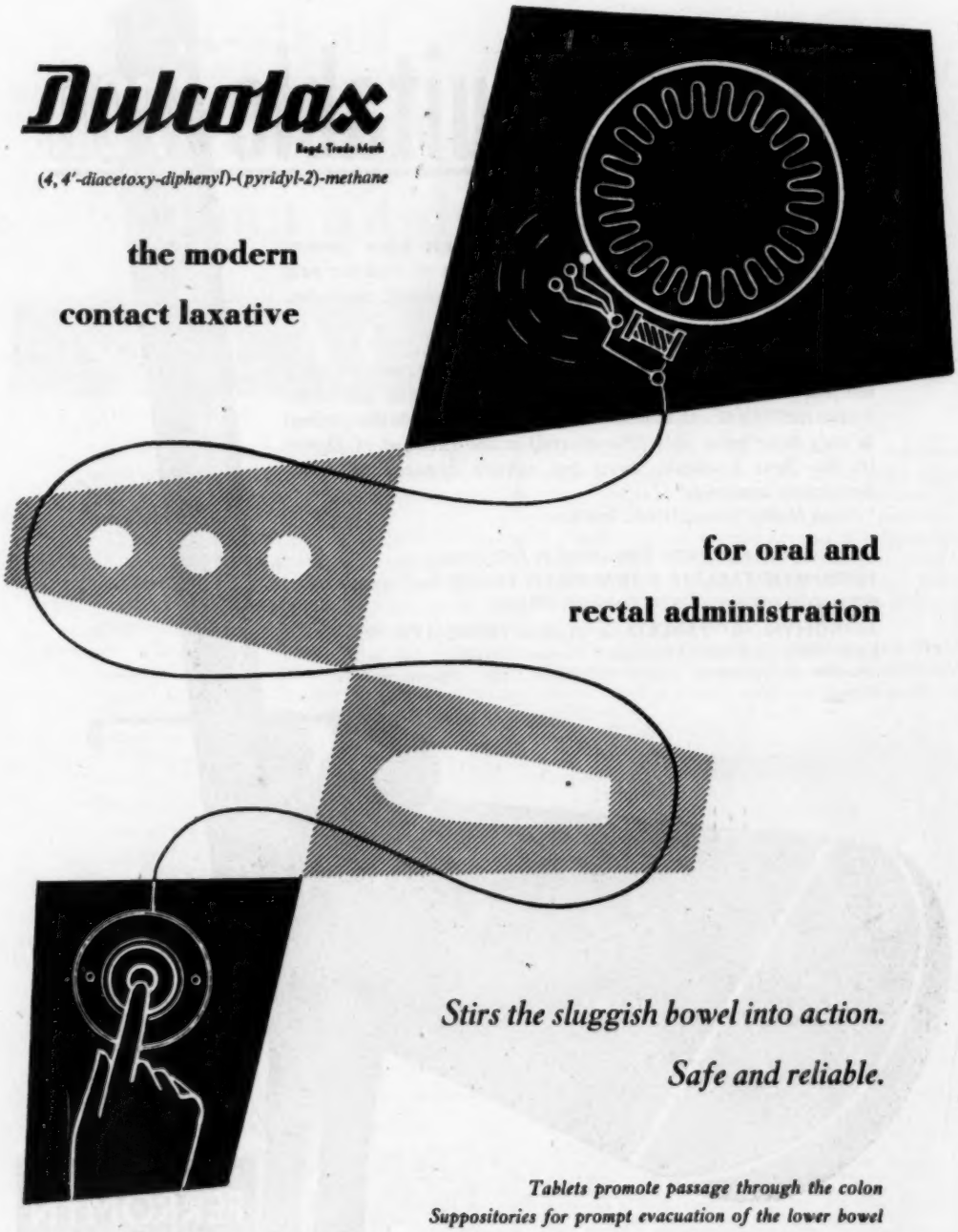

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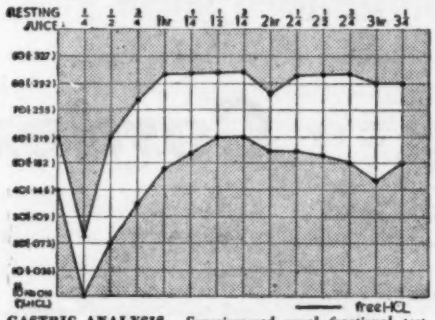

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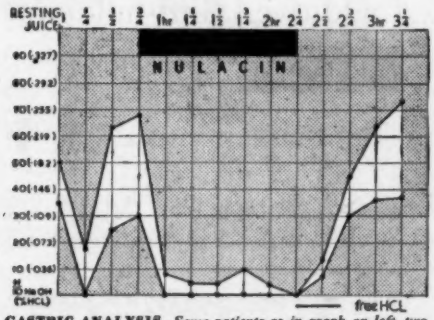


GASTRIC ANALYSIS. *Same patients as in graph on left, two days later, showing the striking neutralizing effect of sucking Nulacin tablets (3 an hour). Note the return of acidity when Nulacin is discontinued.*

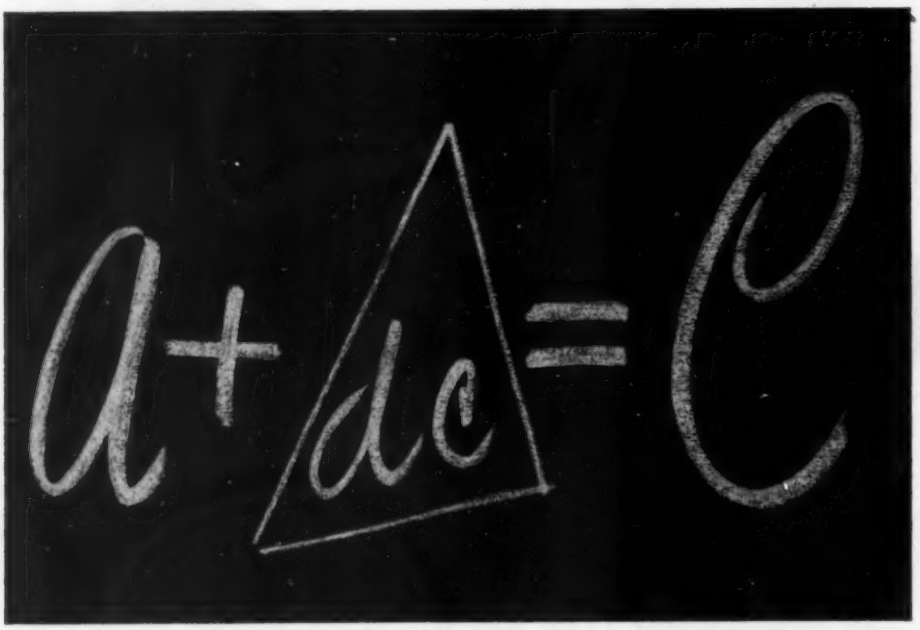
BIBLIOGRAPHY:

The Control of Gastric Acidity. *Brit. Med. J.* 26th July, 1952, 2: 180-182. Medical Treatment of Peptic Ulcer. *Med Press* 27th February, 1952, 227: 195-199. Notes on Remedial Agents. *Med Rev.* September, 1952, 46: 162. Discussion on Peptic Ulceration. *Proc. Roy. Soc. Med.* May 1953, 46: 354. The Effect on Gastric Acidity of "Nulacin" tablets. *Med. J. Aust.* 28th November, 1953, 2: 823-824. Control of Gastric Acidity by a New Way of Antacid Administration. *J. Lab. Clin. Med.* 1953. 42: 955. Further Studies on the Reduction of Gastric Acidity. *Brit. Med. J.* 23rd January, 1954, 1: 183-184. Clinical Investigation into the Action of Antacids. *The Practitioner* July, 1954, 173: 46. Management of Peptic Ulceration in General Practice. *Med. World* December, 1954, 81: 591-601. Ambulatory continuous Drip Method in the Treatment of Peptic Ulcer. *Amer. J. Dig. Dis.* March, 1955, 22: 67-71. Notes on Remedial Agents. *Med. Rev.* October, 1955, 49: 142. Antacids in Peptic Ulcer. *The Practitioner*, January, 1956, 176: 103.

Samples available on request

HORLICKS LIMITED

Pharmaceutical Division, Slough, Bucks.



for

additive anti-inflammatory effects

decreased side-effects

In rheumatic disease Aspirin + Delta-Cortef* (prednisolone Merck) = **Cordex***

Cordex combines Delta-Cortef and acetylsalicylic acid to provide the additive *anti-inflammatory* activity of each drug, plus the *analgesic* action of the salicylate.

With this combination relief of pain is normally afforded in 24 to 72 hours. In the amount employed, Cordex achieves an effect equal to that produced by 2 or more times the amount of adrenal steroid alone. This combination permits a reduction in the dosage of each component, which results in a decrease in undesired side reactions.

Indicated in: fibrositis, tendinitis, synovitis, myositis, bursitis, neuritis, lumbago, painful shoulder, non-articular rheumatism, allergic arthritis, osteoarthritis and mild or low-grade rheumatoid arthritis.

Each CORDEX tablet contains:

Delta-1-hydrocortisone (Prednisolone) .....0.5 mg.

Acetylsalicylic acid .....300.0 mg.

Average dosage 1-2 tablets four times a day.

Bottles of 100 tablets.

CORDEX *is at present available to hospitals only.* *Trade mark

Upjohn

UPJOHN OF ENGLAND LTD., 4 Aldford Street, Park Lane, London, W.1

Relief from asthma—7,200 times

Tedral, taken at bedtime with Tedral Enteric Coated, provides asthmatics with eight hours freedom from asthma. Deep, easy and restful respirations will occur throughout sleep—that means around 7,200 times.

This prolonged relief is achieved by the delayed action. Tedral plain provides four hours of easy breathing—the enteric coated tablet acts after four hours, extending relief till the night is through. Therefore every breath taken during sleep will be free from distress.

Active Principles: Theophylline 2 gr. (120 mg) Ephedrine hydrochloride ⅜ gr. (25 mg) Phenobarbitone ¼ gr. (8 mg).

Dose: During the **day** one tablet of Tedral every four hours. At **night** one tablet of Tedral and one tablet of Tedral Enteric Coated.

Pack: Tedral plain and Tedral Enteric Coated tablets are supplied in bottles of 50. Bottles of 500 supplied to chemists for dispensing. S.IV. poison.

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Tedral

TRADE MARK

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TED 285/4

13

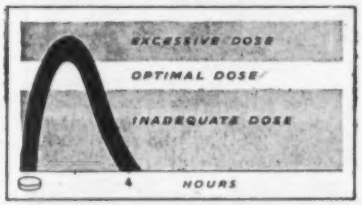
NEW

a new concept in sustained action therapy

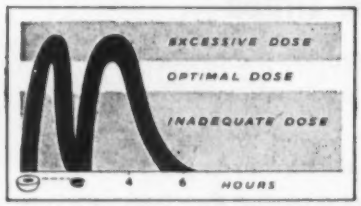
'IONEX-TABS'

WORK ROUND THE CLOCK

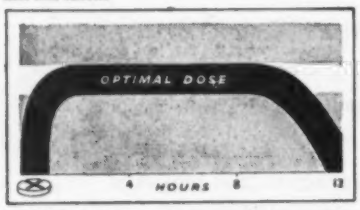
HOW 'ION-EX' EVENLY SUSTAINED ACTION TABLETS DIFFER FROM ORDINARY AND DELAYED-ACTION 'LAYERED' TABLETS & CAPSULES



Ordinary tablets and capsules produce unnecessarily high drug concentrations during peak periods with increased danger of avoidable side-reactions.



Delayed-action "layered" tablets supply TWO doses (with "ONE SWALLOW") the second of which is delayed by enteric coating. They often produce excessive peak concentrations with resultant avoidable side effects.



'IONEX-TABS'—uninterrupted therapeutic or prophylactic effect lasting 10-12 hours. No peak concentrations in excess of therapeutic requirements, fewer and less severe side-reactions.

In 'IONEX-TABS' the prolonged action is inherent in the ion-exchange resin-drug complex. Controlled ionic exchange EVENLY feeds the drug into the blood stream for 10 to 12 hours independent of physiological factors.

Ref. Sustained release of drugs from 'Ion Exchange Resins' J. Pharm. Pharmacol. Nov. '56. Page 975.

EVENLY SUSTAINED EPHEDRINE THERAPY

'asmapax'

FORMULA
Ephedrine Resinate.....100 mg.
(*containing equivalent of* ½ *gr. Ephed. HCl.*)
Theophylline.....65 mg.
Bromvaletone.....150 mg.
Euphemesin.....60 mg.

24 HOURS PROPHYLAXIS IN BRONCHIAL ASTHMA with ONE morning and ONE evening DOSE

Average basic N.H.S. cost of 24 hrs. prophylaxis—4d.

EVENLY SUSTAINED DEXAMPHETAMINE THERAPY

'dexten'

FORMULA
Dexamphetamine Resinate .....35 mg.
(*containing equivalent of 10 mg. Dexamphet. Sulph.*)

ONE DOSE provides:—

ALL DAY APPETITE SUPPRESSION
ALL DAY RELIEF OF DEPRESSION AND FATIGUE

Average daily basic N.H.S. cost of treatment—1d.

EVENLY SUSTAINED DEXAMPHETAMINE THERAPY PLUS SEDATION

'barbidex'

FORMULA
'dexten' plus Phenobarb. 65 mg. (1 gr. approx.)

ONE DOSE provides:—

DAY-LONG APPETITE CONTROL
DAY-LONG RELIEF OF DEPRESSION
WITH PROLONGED SEDATION

Average daily basic N.H.S. cost of treatment—1½d.

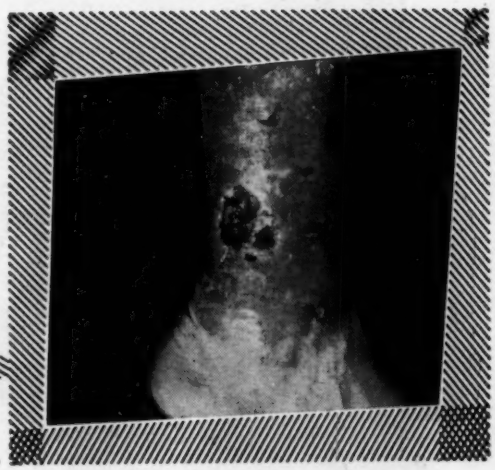
AN ORIGINAL CPL RESEARCH PRODUCT

Clinical samples and literature on request

CLINICAL PRODUCTS LTD.
RICHMOND, SURREY

The use of stabilized Trypsin

A NEW TREATMENT FOR **ULCERS** **ABRASIONS** **BURNS** **PYODERMIAS**



ANY MEDICAL PRACTITIONER knows how stubbornly resistant to any therapy a long-standing varicose ulcer can be. The reason is partly the diminished blood supply, but more perhaps the formation of a pus-containing layer and of crusts which cover the ulcer and impede the healing process. Similar difficulties are often encountered in the treatment of wounds and abrasions.

PROTEOLYTIC ACTION

It has long been known that the proteolytic enzyme trypsin could digest crusts by the process of physiological currettage. The difficulty has been to incorporate the trypsin in a stable preparation. In Biotrase, trypsin remains active physiologically for over one year. It rapidly dissolves crusts and scabs and leaves a clean, granulating surface. A certificate of stability has been issued by a Department of Bio-chemistry.

Biotrase has been designed by Lloyd-Hamol of London and Zurich for the treatment of infected skin lesions. Apart from trypsin, it contains two new antiseptic agents of proved bacteriolytic properties, Ca-N-Hydroxymethylglutaminate and 2,2¹ thiobis-(4,6-dichlorophenol), designated bithionol, both of which are effective against a wide range of gram-positive and gram-negative pathogenic organisms and do not cause skin sensitivity. Biotrase also contains carbamide, included for its buffering properties.

INDICATIONS FOR USE

Biotrase may be used wherever there is an infected—or potentially infected—breach of surface of the skin. Common conditions for its use include the following: Varicose, diabetic and post-thrombotic ulcers; wounds, and second and third degree burns; infected and necrotic skin conditions, including pyodermias; boils and carbuncles (following incision).

COMPOSITION OF BIOTRASE

Trypsin pur.	0.16%
Ca-N-Hydroxymethylglutaminate	5.00%
2,2¹ *thiobis-(4,6-dichlorophenol)*	0.50%
Carbamide B.P.	5.00%
In polyethylene glycol	

Biotrase

Biotrase is available in 35 g. tubes at a basic N.H.S. price of 3/9d. plus Purchase Tax. Samples and literature are available to medical practitioners on request.

'Biotrase' is a registered trade mark of

LLOYD-HAMOL LIMITED
11 Waterloo Place, London, S.W.1.

The happy years

THE menopausal patient on 'Premarin' therapy can usually expect a rapid readjustment to her new physiological environment. Outstanding among the advantages of 'Premarin' are the prompt relief of symptoms noted in the majority of cases, and the virtual absence of untoward side effects. Furthermore, the sense of well-being so frequently imparted tends to restore a normal mental outlook.

'Premarin'

an effective natural oestrogen

'Premarin' contains:
Oestrone sulphate plus the sulphates of equilin, equilenin, β-oestradiol, and β-dihydroequilenin, and other conjugated steroids. *Available as tablets of 0.625 mg. (100 and 1,000) and 1.25 mg. (30, 100 and 1,000).*

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Distributed in the U.K. by arrangement with Ayerst, McKenna & Harrison Ltd., Montreal, Canada,

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"But that's just the point, Mr. Baxter...

... it's quite important to remember the difference between the two. Globin insulin contains a foreign protein, globin, to modify the action of the insulin, whereas I.Z.S. contains no protein or peptide, other than the insulin itself. Let me stress once again, gentlemen, that the prolonged effect of I.Z.S. depends entirely on the appropriate adjustment of the particle size of the zinc insulin compound. It is because the effect of I.Z.S. is independent of any modifying protein, that allergic reactions following its use are practically unknown. That is precisely why I.Z.S. is so suitable as the single daily injection of insulin in about 90 per cent. of diabetic patients. Any other questions?"

I.Z.S. A.B. Vials of 10 c.c. 40 or 80 units per c.c.

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Insulin Zinc Suspension A.B.

A|B TRADE MARK

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How severe a gastric irritant is aspirin?

FURTHER RESEARCH has now been done into the irritant effects of aspirin upon the gastric mucosa. A detailed report on this work appears under the heading "Aspirin and Ulcer" in the B.M.J., July 2nd, 1955.

The summary of the discussion appended to this report is as follows:

"Aspirin is a serious gastric irritant, particularly in peptic ulcer patients."

Here is a further extract from the report:—"In conclusion it is suggested that aspirin should never be given to patients with peptic ulceration, or indeed to those who have any gastric intolerance to it, however mild. Such an instruction should be given a prominent place in peptic ulcer advice charts, usually in place of much that could be safely left out. Some of these patients took aspirin on a full stomach only in powder form, with serious results, and, although this method almost certainly mitigates its irritant effects, it does not guarantee immunity. Calcium aspirin does not have this irritant action unless it has deteriorated through standing, and it can be used with impunity, especially if prescribed in soluble form. This simple measure would, in our opinion, cut down significantly, the incidence of haematemesis and exacerbations of ulcer symptoms."

SOLPRIN provides calcium aspirin in pure and stable form.

CODIS is a compound tablet that provides codeine and phenacetin and calcium aspirin, in place of the ordinary aspirin in Tab. Codein. Co. B.P.

Neither SOLPRIN nor CODIS is advertised to the public.

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Pfizer

The deep-spectrum antibiotic

Pfizer

sigmamycin*

OLEANDOMYCIN TETRACYCLINE

PFIZER ANNOUNCE THE IMPENDING INTRODUCTION OF SIGMAMYCIN

Sigmamycin is a synergistic combination of tetracycline and oleandomycin. It has been subjected to rigid tests and trials and the evidence suggests that Sigmamycin possesses distinct therapeutic advantages in the matters of effectiveness, tolerance, and in the prevention of the emergence of resistant strains. Full information on Sigmamycin will shortly be issued.

Pfizer **WORLD'S LARGEST PRODUCER OF ANTIBIOTICS**

Pfizer Ltd · Folkestone · Kent

* *Trade Mark of Chas. Pfizer & Co., Inc.*

INTESTINAL PAIN
RELIEVED
WITHOUT
SIDE-EFFECTS

'Merbentyl' is free from the unpleasant side-effects (drying of the mouth, blurred vision, etc.) normally encountered with both natural and synthetic anticholinergic agents. Its specific action on the gastro-intestinal tract makes it the spasmolytic of choice for the relief of pain in peptic ulcer and similar organic conditions. In addition, it is outstandingly successful for NERVOUS DYSPEPSIA.

'MERBENTYL' tablets are economical—basic daily cost to the N.H.S. is no more than 7d.

MERBENTYL REGD.

In tablets and as a syrup, each tablet or 5 c.c. syrup containing 10 mg. diethylaminocarbethoxybicyclohexyl hydrochloride.

MERBENTYL
with **Phenobarbitone**

in tablets and as a syrup, each tablet or 5 c.c. syrup containing 10 mg. 'Merbentyl' and 15 mg. (gr. ¼) phenobarbitone.

For conditions requiring sedation in addition to antispasmodic therapy.

Merrell

'MERBENTYL' and 'MERBENTYL' WITH PHENOBARBITONE *are distributed in the United Kingdom and Eire by*

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SAFE

PLEASANT

RAPID

ANALGESIA

FOR ALL PAIN *that responds to aspirin; for all palates, and for all patients—even the dyspeptic*—PAYNOCIL *is universally acceptable.*

FOR CHILDREN *there is no pleasanter way of taking aspirin, and coaxing is seldom necessary.* JUNIOR PAYNOCIL *tablets contain just the right dose.*

NON-IRRITANT—the aspirin particles are minutely and evenly spread over the gastric mucosa in a harmless and non-adherent form.

ACCEPTABLE—the flavour of Paynocil is remarkably pleasant and the presence of aspirin is unnoticed.

QUICK DISPERSING—the disintegration of Paynocil tablets on the tongue—without water—has been called "flash dispersal". Chewing is unnecessary and swallowing effortless.

PAYNOCIL

EACH TABLET CONTAINS

Acetylsalicylic acid ..... 10 grains

Aminoacetic acid ..... 5 grains

PACKAGES in sealed foil strips:
Cartons of 18.

Dispensing packs of 240: basic N.H.S. cost (tax free) 21/8d.

Junior PAYNOCIL

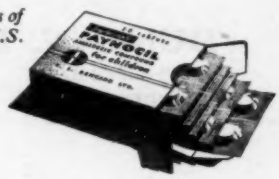
EACH TABLET CONTAINS

Acetylsalicylic acid ..... 2½ grains

Aminoacetic acid ..... 1½ grains

PACKAGES in sealed foil strips:
Cartons of 20.

Dispensing packs of 240: basic N.H.S. cost (tax free) 15/-.



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NEW FORMULATION

Duncan

Pollergen REGD.

MIXED GRASS POLLENS EXTRACT

replacing

Pollergen MIXED GRASS AND TREE POLLENS EXTRACT

"Duncan" extracts for prick tests and hyposensitization with grass pollens in the diagnosis and treatment of hay fever and seasonal asthma have been issued as shown below, and the preparation previously available as "Pollergen" has been withdrawn. Please note the details of the new "Pollergen".

FOR PRICK TESTS: Pack of 2 ml. bottle containing 20,000 Noon units/ml. and 2 ml. bottle of solution for control tests.

FOR HYPOSENSITIZATION: Set of two 5 ml. and two 10 ml. bottles containing respectively 100, 500, 2,500 and 25,000 Noon units/ml. for course of hyposensitization injections.

In recent years, advances have been made in the study of grass pollens and hay fever and seasonal asthma. The new "Pollergen" resulted from these advances. Literature concerning it will be sent on request, and inconvenience will be avoided if physicians who used the old "Pollergen" will kindly make sure that they receive the literature on the new preparation.

DUNCAN, FLOCKHART & CO., LTD.

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COMBIZYM

Multivalent digestive enzyme preparation

Proteases, lipase, amylase, cellulase and hemicellulases, partly of pancreatic, partly of vegetable origin, standardized, of constant enzymatic action

Fully effective upon the whole of the food, irrespective of acid or alkaline reaction of the intestinal tract

Packets of 30 and 150 dragees

MONOTREAN

Basic papaverine with quinine in an approved and well balanced combination

for the symptomatic treatment of vertigo, even in obstinate cases

Packets of 30 dragees

are available for the doctor's use through the firm of

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LUITPOLD-WERK MUNCHEN 25

Aspirin intolerance in rheumatoid arthritis

BUFFERIN—the new, better-tolerated analgesic

Most successful answer yet discovered. The latest report by the Joint Council Committee of the Medical Research Council and the Nuffield Foundation (on clinical trials of cortisone, ACTH, and other therapeutic measures in chronic rheumatic diseases) confirms the findings of the previous year. "At the end of two years, therefore, as previously reported at the end of one year, it appears that for practical purposes there is remarkably little to choose between cortisone and aspirin in the management of this group of patients." (British Medical Journal, 1955, *2*, 695.)

As aspirin is a far cheaper and less dangerous therapeutic agent it is obvious why practitioners prefer it to cortisone. But there is still the problem of aspirin intolerance which affects as many as 42% of arthritic patients. And Bufferin, the new analgesic which reduces gastric upset to a negligible minimum, is certainly the most successful answer yet discovered. (J.A.M.A., June 4, 1955, p. 387.)

Far better tolerated—even by arthritics. Bufferin combines acetylsalicylic acid with the antacids aluminium glycinate and magnesium carbonate (gentle antacid agents which do not produce "acid rebound"), and is well tolerated—even by arthritics. In blind trials amongst arthritics with proven intolerance to ordinary aspirin, 70% had no gastric symptoms after taking large doses of Bufferin over periods of 4 to 16 months. (J.A.M.A., June 4, 1955, p. 387.)

Acts twice as quickly as aspirin. Not only is Bufferin better tolerated by the stomach than ordinary aspirin, but its pain-relieving ingredient is absorbed twice as quickly into the blood-stream. Trials show that on an average the 10-minute salicylate level after taking Bufferin was more than 20% higher than the 20-minute level after taking ordinary aspirin (J. Amer. Pharm. Assoc. 1950, 39:21.)

BUFFERIN HAS NO EQUIVALENT IN THE B.P. OR NATIONAL FORMULARY. THIS FULLY JUSTIFIES THE PRESCRIPTION OF BUFFERIN ON E.C.10.

A detailed, fully documented leaflet and sample are available on request to the makers, Bristol-Myers Co. Ltd., Dept. B., 211 Blackfriars Road, London, S.E.1.

BUFFERIN
TRADE MARK
ANTACID ANALGESIC

Formula: *Acetylsalicylic Acid 5 gr. : Aluminium Glycinate ½ gr. : Magnesium Carbonate 1½ gr*

"One slumber finds another"

HERBERT Jacula Prudentum 1640

The two-phase action of Bidormal ensures steady sedation throughout the night.

As the effect of the short-acting barbiturate pentobarbitone, contained in the outer shell of Bidormal, begins to fade, the action of the butobarbitone, contained in the inner core, takes over smoothly ensuring calm, uninterrupted sleep for approximately eight hours.

The patient awakens refreshed without any trace of drowsiness, hangover or 'drugged' feeling.

BIDORMAL

OUTER SHELL
Pentobarbitone Sodium B.P. 90 mg.
FOR IMMEDIATE ACTION

INNER-CORE
Butobarbitone B.P.C. 60 mg.
FOR DELAYED ACTION

C56/619/H

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IN THE TREATMENT OF INFLAMMATORY SKIN CONDITIONS

HYDROMYCIN by combining the anti-inflammatory properties of Hydrocortisone with the anti-bacterial properties of Neomycin offers increased safety over the use of Hydrocortisone alone. HYDROMYCIN is ideal in the treatment of contact dermatitis, atopic dermatitis and non-specific pruritus.

SKIN OINTMENT *Tubes of 5G and 15G*

EAR/EYE OINTMENT *Tubes of 3G*

THE FULL RANGE OF BOOTS BRITISH-MADE CORTI-COSTEROIDS

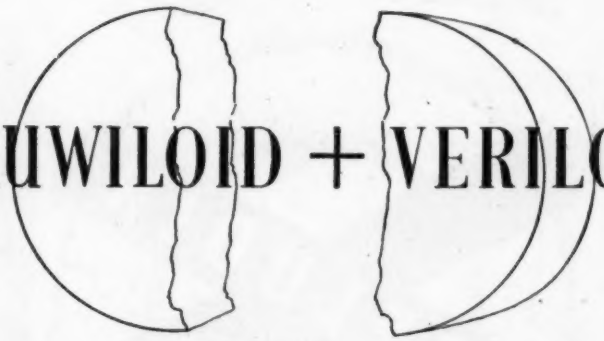
CORTISTAB (Cortisone Acetate) Tablets, Injection, Eye Drops, Eye Ointment.
HYDROCORTISTAB (Hydrocortisone) Tablets, Local & Intravenous Injections, Skin Ointment, Eye Ointment, Eye Drops.
DELTA-STAB (Prednisolone) Tablets.
Delta-stab Tablets are at present available through N.H.S. hospitals only by arrangement with the Ministry of Health.

BOOTS PURE

Literature and further information gladly sent on request:
DRUG COMPANY LIMITED, NOTTINGHAM

Boots

in one tablet



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the treatment of choice for moderate to severe hypertension

The combined action of the Riker alkaloidal extracts 'RAUWILOID' and 'VERILOID' provides a striking example of drug complementation. The response seems to be greater than simple summation of the two effects, and consequently the patient actually requires less of the more potent 'Veriloid'. The margin between the required hypotensive dose of 'Veriloid' and that causing emesis is effectively widened by the presence of the 'Rauwiloid'. This enables satisfactory treatment to be carried out with the minimum of discomfort to the patient.

"*The addition of Rauwiloid makes Veriloid easier to administer and practically does away with unpleasant side reactions*". Amer. J. Med. (1954), 17 : 629.

RAUWILOID—

is a unique preparation of alkaloid hydrochlorides of *Rauwolfia serpentina* accurately standardized.

VERILOID—

a fractionated alkaloidal extract of *Veratrum viride* which is biologically standardized.

RAUWILOID + VERILOID—

is presented in bottles of 100 (approximately one month's treatment) and 500 tablets. Each tablet contains 1 mg. of 'Rauwiloid' and 3 mg. of 'Veriloid'.

Detailed literature supplied on request.

RIKER

Rauwiloid' and 'Veriloid' are registered trade marks. Registered users :

RIKER LABORATORIES LIMITED,
LOUGHBOROUGH, LEICS.

in cases of obesity

curbs appetite without affecting the heart

PRELUDIN is the doctor's powerful ally where weight reduction and adherence to diet are an essential part of the treatment. It is perfectly safe for cardiovascular conditions, and has no effect on blood pressure.
It is supplied in 25 mg. tablets, in tubes of 20 or bottles of 250.

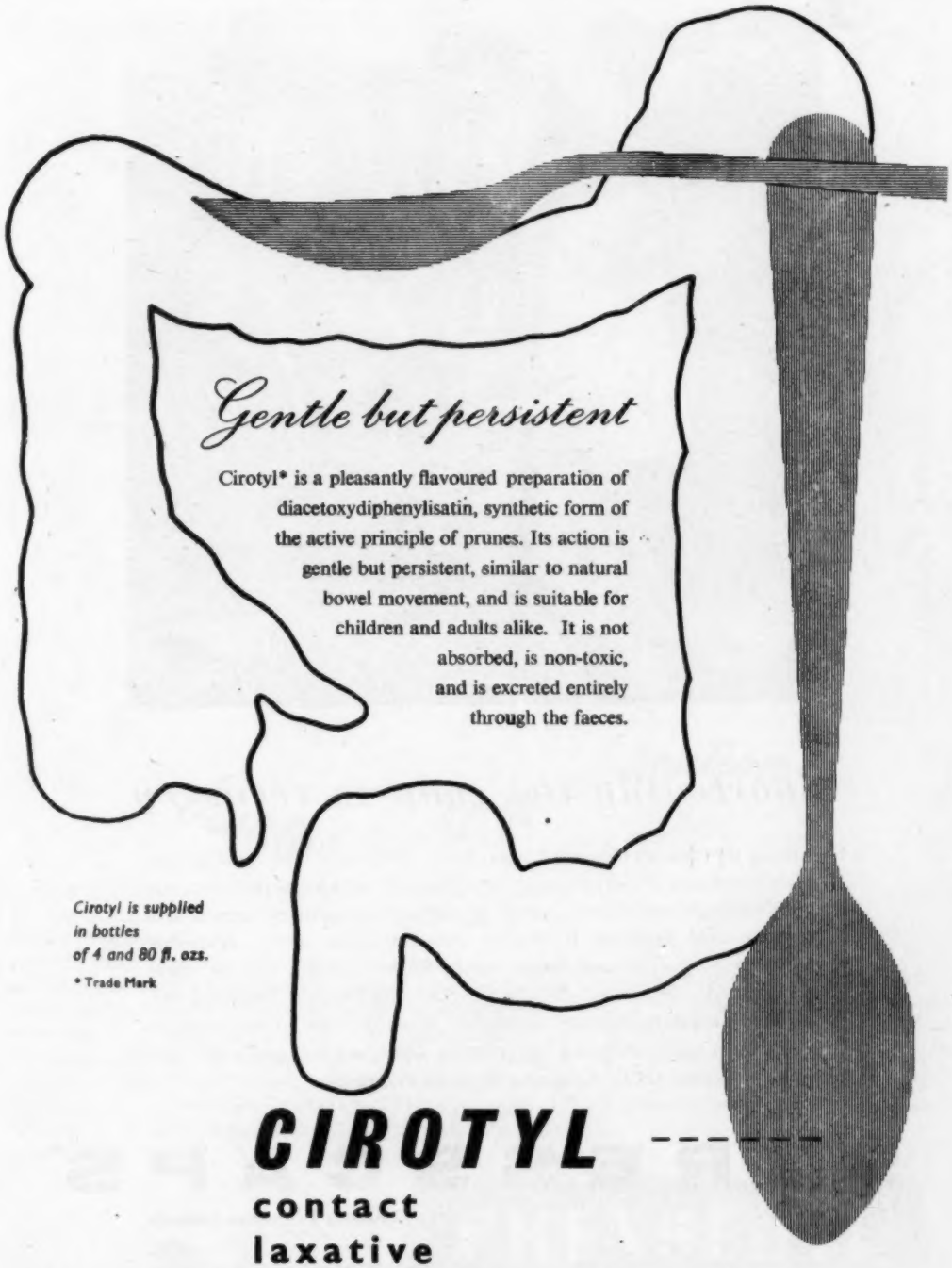
PRELUDIN*

Brand of 2-phenyl-3-methyl-tetrahydro-1,4-oxazine-hydrochloride

The appetite controlling agent that does not affect the heart

INGELHEIM

Manufactured and distributed in England by Pfizer Ltd., Folkestone, Kent, for
C. H. Boehringer Sohn, Ingelheim am Rhein
Registered proprietors of the Trade Mark *Regd. Trade Mark



Gentle but persistent

Cirotyl* is a pleasantly flavoured preparation of diacetoxydiphenylisatin, synthetic form of the active principle of prunes. Its action is gentle but persistent, similar to natural bowel movement, and is suitable for children and adults alike. It is not absorbed, is non-toxic, and is excreted entirely through the faeces.

Cirotyl is supplied in bottles of 4 and 80 fl. ozs.

* Trade Mark

CIROTYL

contact laxative preparation

PARKE, DAVIS & COMPANY LTD. *(Inc. U.S.A.)* HOUNSLOW • MIDDLESEX • TEL: HOUnslow 2361 720

Shortening the road to recovery

Among the legacies of shock, injury, burns, surgery, severe infection and other conditions of extra-ordinary physiological stress is a period when the body's defences are severely taxed. In such conditions tissue depletion of ascorbic acid and the B-complex vitamins often occurs, hindering antibody production and tissue repair. Such situations can be safely surmounted with STRESSCAPS—the new LEDERLE formula combining five essential factors in effective therapeutic amounts. One or two capsules daily will usually overcome the vitamin deficiency and prove the real value of STRESSCAPS in shortening the road to recovery.

STRESSCAPS*

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Stress Formula Vitamins Lederle

Each capsule contains: THIAMINE MONONITRATE, 10 mg; RIBOFLAVINE, 10 mg; NIACINAMIDE, 100 mg; ASCORBIC ACID, 300 mg; FOLIC ACID, 5 mg. *In bottles of 30.*

LEDERLE LABORATORIES DIVISION

Cyanamid PRODUCTS LTD. **LONDON, W.C.2**

Just the right combination

Cold, damp and smoke—just the right combination to produce the fog which sets people coughing and sends them to their doctor in search of relief.

And the relief is readily available with the M&B brand cough linctus 'Phensedyl', which contains promethazine for its prolonged antihistamine, local analgesic and central sedative action, ephedrine for its broncho-dilator activity and codeine for its depressant effect on the cough reflex. Whatever the cause of cough — whether it is "smog", smoking, the aftermath of influenza, or a more serious condition — these properties of 'Phensedyl' usually bring relief. They provide the right combination.

Supplied in bottles of 4 and 40 fl. oz. Each 3.6 c.c. (*approximately 1 teaspoonful*) contains:

Promethazine Hydrochloride B.P. 3.6 mgm.
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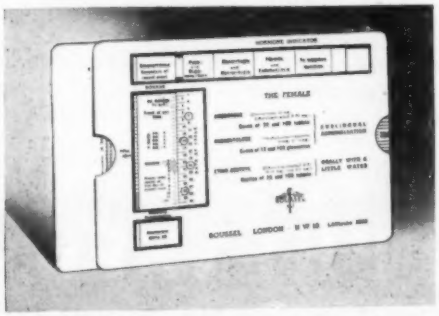

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POLIOMYELITIS AND PROPHYLACTIC INOCULATION

AGAINST DIPHTHERIA, WHOOPING-COUGH, AND SMALLPOX

REPORT OF THE MEDICAL RESEARCH COUNCIL COMMITTEE ON INOCULATION PROCEDURES AND NEUROLOGICAL LESIONS *

THE reports of Hill and Knowelden (1950), Anderson and Skaar (1951), Korns, Albrecht, and Locke (1952), and Grant (1953) all supported the evidence brought forward by Martin (1950), Geffen (1950), and McCloskey (1950) that there was occasionally a causal relation between paralytic poliomyelitis and the inoculation of prophylactics against diphtheria and whooping-cough given singly or mixed. These observers were unable to give an accurate assessment of the risk or to be sure whether some prophylactics were more likely to be followed by the occurrence of paralysis than others, because they had no accurate information about the number of inoculations given.

Early in 1951 medical officers of health in England and Wales agreed to collaborate with the Medical Research Council in a study of the problem and to provide information on all notified cases of poliomyelitis. The information requested included details of diphtheria and pertussis prophylactics † and of smallpox vaccine given 84 days (12 weeks) or less before the onset of symptoms.

Medical officers of health, or their health visitors or sanitary inspectors, visit the homes of poliomyelitis patients as a routine soon after cases have been notified, and complete reports. It was therefore easy for them to add to the usual list of questions one about inoculations given before the onset of symptoms. For children inoculated at welfare centres or school clinics, and for most of those inoculated by general practitioners the medical officer of health was able to check the patient's story, or that of his parents or relatives, with the records in the health department. When no record was available in the health department the history was checked with the general practitioner or hospital medical officer concerned. One of the secretaries of the Committee, or Dr. D. Thomson, Ministry of Health, visited the areas in England from which cases were reported, and Dr. I. A. Bolz visited the areas in Wales; in collaboration with the medical officers of health and hospital clinicians or general practitioners they obtained as full a history as possible of the inoculations given and of the clinical and general epidemiological findings.

In addition a special request for information on the number of inoculations given to children was made to the medical officers of health for the county boroughs of England and Wales, for the administrative counties of London and Middlesex, and for the five non-county boroughs with populations of over 100,000—Dagenham, Ilford, Leyton, Luton, and Walthamstow. Between May, 1951, and December, 1953, these medical officers of health supplied week by week a record of all inoculations given in welfare or school clinics. Records of children inoculated by their own doctors were not asked for, because the long interval which sometimes elapses before general practitioners submit their records of immunisation to the local authority would have made it difficult to relate the returns to the weeks in which the inoculations were given. The records from clinics gave the numbers of inoculations in detailed age-groups, as well as for the separate prophylactics, and indicated whether the inoculations were the first, second, or third of a primary course or were reinforcing. For convenience, the clinics in these different areas will be referred to as "county-borough clinics."

Cases in England and Wales 1951-53

NUMBER OF CASES NOTIFIED AND NUMBER INVESTIGATED

During the study, from April 1, 1951, to Dec. 31, 1953, 7023 paralytic and 3757 non-paralytic cases in patients of all ages were notified (corrected notifications) in England and Wales; the Committee obtained reports on all but 152 paralytic and 101 non-paralytic cases. Those for which reports were not received were usually in rural or small urban districts where often only one or two cases were notified during the inquiry. The prophylactics mentioned are, with the exception of smallpox vaccine, seldom given to persons over 15 years of age; this report is therefore based on children up to 15 years of age reported to us as cases of poliomyelitis and known to have had inoculations of one or more of the stated prophylactics within 12 weeks (84 days) before the onset of symptoms. Of the 478 such cases reported 66 were excluded from the analysis—24 because the diagnosis was changed, 10 because the diagnosis was doubtful, and 32 because they were not reported until more than three months after the onset of symptoms, or because it was impossible to obtain accurate information about them. Altogether 412 cases, of which 354 were paralytic and 58 non-paralytic, were fully investigated and included in the analysis. Table I provides information on the age of the patients at onset of symptoms, the type of illness (paralytic or non-paralytic), and the prophylactics used. From the table it is clear that most of the children investigated were between 6 months and 2 years old or between 4 and 6 years old. These are the ages at which primary courses and reinforcing doses are commonly given.

INTERVAL BETWEEN INOCULATION AND ONSET OF POLIOMYELITIS

The 355 paralytic cases (one child given inoculations of two different prophylactics at the same time has been included as two separate cases) are shown in table II by the interval in days between the date of the *last*—that is the *most recent*—inoculation and the date of the onset of symptoms, and by the type of prophylactic inoculated. They have been divided into three further groups: (*a*) those in children who did not complete the primary course before the illness began; (*b*) those in children who developed symptoms after the final inoculation of the primary course; and (*c*) those in children who developed symptoms after a reinforcing dose. The 58 non-paralytic cases are shown in the same table but, as there were not many of them, they were not grouped under the different prophylactics. Without laboratory confirmation it was difficult to be sure that so-called non-paralytic poliomyelitis was due to the poliomyelitis virus, and nothing is to be gained by considering these cases further in this report.

For primary immunisation against diphtheria or whooping-cough two or three inoculations are given,

* The members of the committee are: Dr. G. S. WILSON (chairman), Dr. W. H. BRADLEY, Dr. E. A. CARMICHAEL, Dr. E. T. CONYBEARE, Prof. F. GRUNDY, Prof. A. BRADFORD HILL, F.R.S., Dr. F. O. MACCALLUM, Dr. W. RITCHIE RUSSELL, Mr. H. J. SEDDON, Dr. I. N. SUTHERLAND, Dr. IAN TAYLOR, Dr. J. F. WARIN, and Dr. W. C. COCKBURN and Dr. J. KNOWELDEN (joint secretaries). The plans of the studies were prepared by the joint secretaries, who analysed the information and prepared the report.

† Information was asked about alum-precipitated toxoid (A.P.T.), purified diphtheria toxoid aluminium phosphate precipitated (P.T.A.P.), diphtheria toxoid-antitoxin floccules (T.A.F.), formol (diphtheria) toxoid (F.T.); pertussis vaccine, plain suspension; mixed diphtheria-pertussis vaccine with alum, mixed diphtheria-pertussis vaccine without alum.

TABLE I—1951–53. ENGLAND AND WALES: PARALYTIC AND NON-PARALYTIC CASES BY AGE AT ONSET OF ILLNESS AND TYPE OF PROPHYLACTIC

Age	Paralytic cases									Non-paralytic cases								
	A.P.T.	P.T.A.P.	T.A.P.	F.T.	Plain pertussis	Mixed, with alum †	Mixed, without alum †	Smallpox vaccine	All prophylactics	A.P.T.	P.T.A.P.	T.A.P.	F.T.	Plain pertussis	Mixed, with alum †	Mixed, without alum †	Smallpox vaccine	All prophylactics
0–5 mos.	—	—	—	—	—	—	—	6	6	—	—	—	—	—	—	—	2	2
6–11 ,,	21	9	1	1*	7	25	5	4	73	1	—	—	—	—	—	1	—	2
12–17 ,,	37	8	—	2	7	40	13	—	107	2	1	—	—	1	2	—	1	7
18–23 ,,	9	2	—	—	5	4	4	—	24	1	—	—	—	—	—	—	—	1
2 yr. ..	5	2	—	1	2	10	2	—	22	2	—	—	—	2	—	—	—	4
3 ,, ..	4	—	—	—	1	4	1	1	11	—	1	—	—	1	—	—	—	2
4 ,, ..	11	2	1	—	2	3	1	2	22	6	—	—	—	1	—	1	—	8
5 ,, ..	35	3	8	—	2	2	2	—	52	14	—	4	—	—	—	—	—	18
6 ,, ..	11	2	3	—	1	1	—	—	18	3	1	—	—	—	—	—	—	4
7 ,, ..	2	1	3	—	—	1	—	1	8	—	—	—	—	—	—	—	1	1
8 ,, ..	1	—	—	—	1	—	—	1	3	1	—	—	—	—	—	—	—	1
9 ,, ..	3	—	2	—	—	—	1	—	6	—	—	3	—	—	—	—	—	3
10 ,, ..	—	—	1	—	—	—	—	1	2	—	—	1	—	—	—	—	—	1
11 ,, ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12 ,, ..	—	—	—	—	—	—	—	—	—	1	—	2	—	—	—	—	—	3
13 ,, ..	—	—	1	—	—	—	—	—	1	1	—	—	—	—	—	—	—	1
All ages ..	139	29	20	4	28	90	29	16	355	32	3	10	—	5	2	2	4	58

* This case was in a boy given formol toxoid in one arm and plain pertussis vaccine in the other at the same time. He appears in this table under both "F.T." and "Plain pertussis" and in tables II and IX under "T.A.P. and F.T." and "Plain pertussis."

† In this and subsequent tables: Mixed, with alum = alum-precipitated diphtheria-pertussis vaccine.
Mixed, without alum = non-alum-precipitated diphtheria-pertussis vaccine.

usually with an interval of about a month between them. Reinforcing doses, on the other hand, are nearly always single and are not likely to be repeated except after long intervals. From the information on reinforcing doses in table II it is clear that about twice as many children developed paralytic poliomyelitis within 1–28 days after inoculation as did so after either 29–56 days or 57–84 days. This finding was not complicated by the giving of multiple inoculations over a short period, and, coupled with the observation below that the incidence of poliomyelitis in children inoculated two and three months before the onset of symptoms was similar to that for all children in England and Wales (see table VII), it confirmed the views of earlier observers that, if a causal relation did exist between inoculations and paralytic poliomyelitis, the effect was limited to a period of about four weeks. This justified the choice of the most recent inoculation before the onset of symptoms as the one from which to measure the inoculation-onset interval.

The concentration of cases in the 1–28 day interval was observed not only in children given reinforcing doses but also in children who had completed a primary course and in children who had had one or more inoculations but had not completed the primary course. The concentration was in fact greatest in the last-mentioned children. As Gray (1953) has pointed out, however, a concentration in this group is bound to arise even when there is no causal relation between inoculations and poliomyelitis. The reason for this is that the occurrence of any interval longer than 28 days after inoculation

TABLE II—1951–53. ENGLAND AND WALES: PARALYTIC AND NON-PARALYTIC CASES GIVEN INCOMPLETE AND COMPLETE PRIMARY COURSES AND REINFORCING DOSES—INTERVAL FROM INOCULATION TO ONSET IN DAYS, AND TYPE OF INOCULATION

Interval (days)	Paralytic cases																					Non-paralytic cases		
	A.P.T.			P.T.A.P.			T.A.P. and F.T.			Plain pertussis			Mixed, with alum			Mixed, without alum			* Vaccine lymph	All prophylactics			All prophylactics		
	Primary		Re.	Primary		Re.	Primary		Re.	Primary		Re.	Primary		Re.	Primary		Re.		Primary		Re.	Primary		Re.
	Inc.	Com.		Inc.	Com.		Inc.	Com.		Inc.	Com.		Inc.	Com.		Inc.	Com.			Inc.	Com.		Inc.	Com.	
1–7 ..	4	4	3	—	1	1	2	—	2	1	—	—	6	2	—	1	1	—	2	14	10	6	—	2	5
8–14 ..	8	10	19	3	4	1	1	—	2	6	2	—	19	11	2	3	2	—	2	40	37	24	1	1	1
15–21 ..	3	7	5	3	2	2	—	—	—	3	2	—	25	5	—	3	2	—	3	37	21	7	3	1	2
22–28 ..	3	10	7	3	—	—	—	—	1	1	2	—	4	4	—	4	—	1	2	15	18	9	—	1	4
1–28 ..	18	37	34	9	7	4	3	—	5	11	6	—	54	22	2	11	5	1	9	106	86	46	4	5	12
29–35 ..	1	7	2	—	—	—	1	—	2	3	1	—	1	—	—	—	2	—	—	6	10	4	—	—	2
36–42 ..	2	1	5	—	1	—	—	—	—	—	—	—	2	—	—	2	—	—	1	6	3	5	—	2	2
43–49 ..	—	1	6	—	—	—	—	—	1	1	—	—	1	1	—	—	—	—	1	2	3	7	—	1	2
50–56 ..	—	4	2	—	2	—	—	—	3	—	—	—	—	—	—	1	2	—	1	1	9	5	—	2	2
29–56 ..	3	13	15	—	3	—	1	—	6	4	1	—	4	1	—	3	4	—	3	15	25	21	—	5	13
57–63 ..	—	3	2	—	1	1	1	—	3	1	2	—	1	1	—	—	1	—	1	3	9	6	1	2	2
64–70 ..	1	1	1	—	1	2	—	—	2	—	—	—	1	1	1	1	1	—	—	3	4	6	—	3	2
71–77 ..	1	2	2	—	—	—	—	—	2	1	—	—	1	—	—	—	2	—	2	3	6	4	—	3	2
78–84 ..	—	3	3	—	—	1	1	—	—	1	1	—	1	—	—	—	—	—	1	3	5	4	—	—	4
57–84 ..	2	9	8	—	2	4	2	—	7	3	3	—	4	2	1	1	4	—	4	12	24	20	1	8	10
All intervals ..	23	59	57	9	12	8	6	—	18	18	10	—	62	25	3	15	13	1	16	133	135	87	5	18	35

Inc., incomplete primary course. Com., complete primary course. Re., reinforcing dose.
* Included in "Com." column under "All prophylactics."

is prevented by the performance of the second or third inoculation. The onset of poliomyelitis is not the only reason for the interruption of primary courses; holidays, changes of address, illnesses other than poliomyelitis, and a variety of other happenings can also cause delay, so that some children who have not completed the primary course do develop the disease more than a month after the last inoculation. The concentration of cases in the first four weeks after a reinforcing dose or the final dose of a completed primary course is not subject to the fallacy mentioned above. The figures strongly suggest a causal relation between the inoculations and the paralysis, and this is strengthened by the fact that the cases were not distributed equally through the first four weeks after inoculation. As is shown in table II, 30 (13%) of the 238 cases in this interval occurred between the 1st and 7th days, 101 (42%) between the 8th and 14th days, 65 (27%) between the 15th and 21st days, and the remaining 42 (18%) between the 22nd and 28th days; children given incomplete courses were included in this comparison. The evidence cannot, however, be taken as conclusive without further information, as the distribution of intervals between inoculation and the onset of poliomyelitis depends both on the seasonal incidence of poliomyelitis and on the number of inoculations given at different times of the year.

RISK OF PARALYTIC POLIOMYELITIS AT DIFFERENT INTERVALS AFTER INOCULATION

(All Prophylactics except Smallpox Vaccine)

The records of inoculations given in clinics in the county-borough and other large urban areas mentioned above gave the necessary information on the seasonal distribution of inoculations and were used along with the 92 paralytic cases which occurred in children inoculated in clinics in these areas to make an assessment of the risk. This part of the analysis was confined to children under ten years of age. The whole period from the week ending May 12, 1951, to the week ending Dec. 12, 1953, was divided into thirty-four 4-weekly periods, and for each of these the number of inoculations in all the areas supplying records was obtained. The 4-weekly totals distinguished between prophylactics but grouped all ages under ten years together. Separate totals were prepared for reinforcing inoculations, final inoculations of primary courses, and first or second inoculations of incomplete courses. The cases of paralytic poliomyelitis had already been correspondingly classified.

Even if there was no association between inoculation and paralysis, children inoculated in a 4-weekly period immediately before the usual seasonal rise in incidence—e.g., the 14th period in this series May 4–31, 1952—would have less chance of developing poliomyelitis in the first month after their inoculations (i.e., in June, 1952), when the seasonal rise was just beginning to occur, than in the third month after their inoculation (i.e., in August, 1952), when the epidemic was at its height. On the other hand, a group inoculated as the epidemic was waning (e.g., in the 20th period, Oct. 19 to Nov. 15) would have a decreasing incidence of poliomyelitis as the time from their inoculations increased. Comparison of the incidence-rates at different intervals of time *after* inoculations given in a particular 4-weekly period is, therefore, biased by the seasonal pattern of the disease. To avoid this, the rates used relate the cases in a particular period to the number of inoculations given in the intervals 1–28, 29–56, and 57–84 days *before* the occurrence of the cases. Thus, for example, the cases with onset 1–28 days after an inoculation given in period 16 will have their onset in the same calendar interval as cases occurring 29–56 days after an inoculation given in period 15, and as cases occurring 57–84 days after an inoculation given in period 14. The appropriate comparison of the incidence-rates for the three intervals of time after inoculation is obtained, therefore, from rates in the general form:

(i)
$$\frac{\text{Cases whose last inoculation was 1–28 days before onset and given in the 4-weekly period Z}}{\text{Number of inoculations given in 4-weekly period Z}}$$

(ii)
$$\frac{\text{Cases whose last inoculation was 29–56 days before onset and given in the 4-weekly period Z–1}}{\text{Number of inoculations given in 4-weekly period Z–1}}$$

(iii)
$$\frac{\text{Cases whose last inoculation was 57–84 days before onset and given in the 4-weekly period Z–2}}{\text{Number of inoculations given in 4-weekly period Z–2}}$$

Using the same argument, rates for the whole experience 1951–53 were calculated as follows:

Interval	*Denominator and numerator of incidence-rate*
1–28 days from inoculation ..	Inoculations and cases inoculated in periods 3–34
29–56 ,, ,, ,, ..	Inoculations and cases inoculated in periods 2–33
57–84 ,, ,, ,, ..	Inoculations and cases inoculated in periods 1–32

The incidence of paralytic poliomyelitis occurring 1–28, 29–56, or 57–84 days after the last prophylactic inoculation for the whole period of study, 1951–53, is given in table III. This table shows the rates for reinforcing doses and for last inoculations in completed and incomplete primary courses separately, but does not include 29–56 or 57–84 day rates for last inoculations in incomplete courses. It has already been explained that cases of this category can only occur when a course of primary immunisation has been interrupted; unfortunately the corresponding denominators, the number of inoculations in interrupted courses, could not be obtained from the records. The incidence of paralytic poliomyelitis 1–28 days after reinforcing inoculations, 3·2 per 100,000, was over twice that in the 29–56 or 57–84 day intervals, 1·2 and 1·5 per 100,000. Similarly, the incidence within 1–28 days after the last inoculation in completed primary courses, 4·2 per 100,000, was three times that in the longer intervals, where the rates were 1·4 and 1·2. The 1–28 day rate for last inoculations in incomplete primary courses was about the same as that for completed courses. There was a close similarity between the 29–56 and 57–84 day rates for both reinforcing doses and for last inoculations in completed primary courses.

TABLE III—1951–53. CHILDREN INOCULATED IN COUNTY-BOROUGH CLINICS*: INCIDENCE OF PARALYTIC POLIOMYELITIS AT INTERVALS OF 1–28, 29–56 AND 57–84 DAYS AFTER INOCULATION—ALL PROPHYLACTICS

Interval from last inoculation (days)	Reinforcing doses			Completed primary courses			Incomplete primary courses		
	Inoculations	Cases	Rate per 100,000	Inoculations	Cases	Rate per 100,000	Inoculations	Cases	Rate per 100,000
1–28	408,637	13	3·2	504,633	21	4·2	780,154	34	4·4
29–56	406,334	5	1·2	509,025	7	1·4	—	—	—
57–84	403,505	6	1·5	513,725	6	1·2	—	—	—

* In this table and in tables IV–VIII the term "county borough" includes also the administrative counties of London and Middlesex and the municipal boroughs of Dagenham, Ilford, Leyton, Luton, and Walthamstow.

The 1–28 day rate was less for reinforcing inoculations than for last inoculations given in either completed or incomplete courses, but the difference was not significant. As, however, some prophylactics were not equally used for both primary and reinforcing immunisation, a better comparison was between rates limited to those prophylactics, such as A.P.T. and P.T.A.P., which were frequently used for both purposes. The records of these two prophylactics combined showed that the 1–28 day incidence-rates were 3·5 per 100,000 for reinforcing doses,

TABLE IV—1951–53. CHILDREN INOCULATED IN COUNTY-BOROUGH CLINICS: INCIDENCE OF PARALYTIC POLIOMYELITIS IN A 4-WEEK PERIOD FOR 1–28 DAY AND 29–84 DAY INTERVALS AFTER INOCULATION WITH DIFFERENT PROPHYLACTICS

Prophylactic	1–28 day interval			29–84 day interval		
	Inoculations	Cases	Rate per 100,000	Inoculations	Cases	Rate per 100,000
A.P.T.	711,376	24	3·4	927,329	13	1·4
P.T.A.P.	266,007	16	6·0	346,628	4	1·2
Formol toxoid and T.A.F. ..	139,778	2	1·4	199,981	2	1·0
Pertussis vaccine	310,403	6	1·9	208,544	2	1·0
Mixed, with alum ..	188,638	15	8·0	112,393	2	1·8
Mixed, without alum ..	77,222	5	6·5	37,714	1	2·7
All prophylactics	1,693,424	68	4·0	1,832,589	24	1·3

5·0 for last inoculations in completed courses, and 3·7 for last inoculations in incomplete courses. These differences were not significant.

The analysis thus confirmed that, over the whole period 1951–53, taking all prophylactics together, there was an increased risk of poliomyelitis developing within 28 days after a prophylactic inoculation, but that beyond this period the incidence was similar for both 29–56 and 57–84 day intervals. There was no evidence that a series of inoculations had a cumulative provoking effect, since the risk at 1–28 days for last inoculations in completed primary courses was the same as for last inoculations in incomplete courses.

RISK OF PARALYTIC POLIOMYELITIS AFTER INOCULATIONS OF DIFFERENT DIPHTHERIA AND PERTUSSIS PROPHYLACTICS

Detailed tables were prepared, but are not reproduced here, to show for each prophylactic included in the reports the risks for the three interval groups and for reinforcing doses and for last inoculations in completed and incomplete courses separately. The number of cases falling into some of these subgroups was often too small to give stable rates. From table III and from the detailed tables on which table IV was based there was no evidence of a large or consistent difference between the rates for 29–56 and 57–84 days. These two intervals were therefore amalgamated to give one rate for 29–84 days. This rate was calculated as a measure of the risk of contracting poliomyelitis within a period of four weeks—i.e., it was a mean and not a summation of the 29–56 and 57–84 day rates. It could therefore be compared directly with the 1–28 day rate. In the detailed tables no difference emerged between the rates for reinforcing doses and last inoculations in completed courses in the few prophylactics, such as A.P.T., which were used extensively for both. A further amalgamation was made, therefore, to give one rate for 29–84 days, for both reinforcing doses and last inoculations in completed courses. Moreover, for the 1–28 day rate, inoculations in incomplete courses were added to the other two groups, because this increased the size of the experience and the stability of the rate without producing any appreciable difference from the rate based on last inoculations in completed courses and reinforcing doses only.

Table IV, summarising detailed tables by these amalgamations, shows the incidence of paralytic poliomyelitis per 100,000 in a 4-week period for the 1–28 day and 29–84 day intervals after inoculation with the different diphtheria and whooping-cough prophylactics. For each prophylactic listed in this table the incidence of paralytic poliomyelitis 1–28 days after inoculation exceeded the corresponding incidence 29–84 days after inoculation. This increased risk was greatest for the alum-precipitated mixed diphtheria-pertussis prophylactic and least for T.A.F. and F.T. and plain pertussis vaccine. A.P.T. P.T.A.P., and non-alum-precipitated mixed diphtheria-pertussis prophylactic held an intermediate position. The risk with P.T.A.P. appeared higher than with A.P.T., but the number of cases was small and the difference was not significant. The risk with non-alum-precipitated mixed diphtheria-pertussis prophylactic also appeared higher than that for A.P.T., but again the number of cases was small. The differences between the 1–28 day and the 29–84 day rates were significant ($P<0.05$) for all prophylactics except formol toxoid and T.A.F. and plain pertussis vaccine. The 29–84 day rates for the separate prophylactics were very similar and well within the sampling differences likely to occur with the numbers of cases given inoculations at this interval before onset. This, together with the similarity between the rates for all prophylactics for the 29–56 and 57–84 day intervals shown in table III, suggests that inoculations of any prophylactic preceding the onset of paralytic poliomyelitis by more than 28 days were unassociated with this illness. Within the shorter interval 1–28 days before onset, however, injection of mixed diphtheria-pertussis prophylactics, with or without alum, and of A.P.T. and P.T.A.P. had a definite provoking effect on subsequent paralysis.

INFLUENCE OF AGE ON RISK

It was shown above that the 1–28 day rates for A.P.T. and P.T.A.P. combined were similar for reinforcing doses and inoculations in primary courses, though these were in the main given to children of different ages. To examine in further detail the influence of age on the provoking effect of recent inoculations, rates were calculated for two age-groups, under 4 years and 4–9 years.

TABLE V—1951–53. CHILDREN INOCULATED IN COUNTY-BOROUGH CLINICS: INCIDENCE OF PARALYTIC POLIOMYELITIS IN A 4-WEEK PERIOD FOR THE 1–28 DAY AND 29–84 DAY INTERVALS AFTER INOCULATION (ALL PROPHYLACTICS)

Year	1–28 day interval			29–84 day interval		
	Inoculations	Cases	Rate per 100,000	Inoculations	Cases	Rate per 100,000
1951 (May–Dec.)	325,948	8	2·5	366,432	2	0·5
1952	694,350	36	5·2	749,827	16	2·1
1953	673,126	24	3·6	716,330	6	0·8

Taking all prophylactics together the rates under 4 years of age were 4·7 per 100,000 for the 1–28 day interval and 1·5 per 100,000 for 29–84 days, a ratio of just over 3 to 1. For the older group the corresponding rates were 2·9 and 1·1 per 100,000, a ratio of just under 3 to 1. Although both rates were higher in younger children the provoking effect of recent inoculations appeared in both age-groups.

Some prophylactics, such as T.A.F., were used almost exclusively for reinforcing doses for older children, while others, such as the mixed diphtheria-pertussis prophylactics, were rarely used except for primary courses for younger children. Though the rates for all prophylactics given above suggest that the provoking effect of recent inoculation was much the same in younger and older children, the different prophylactics used in this comparison might mask a real difference due to age. The number of cases was too small to answer this for individual prophylactics, and therefore standardised rates for all prophylactics were calculated which allowed for the different usage in the under 4 and the 4–9 year age-groups. The ratio of the 1–28 day rate to the 29–84 day rate proved to be 3·0 to 1 for children under 4 years of age and 2·8 to 1 for children of 4–9 years of age, thus confirming the conclusion already reached that the

TABLE VI—1952 AND 1953. CHILDREN INOCULATED IN COUNTY-BOROUGH CLINICS: INCIDENCE OF PARALYTIC POLIOMYELITIS IN A 4-WEEK PERIOD FOR 1–28 DAY AND 29–84 DAY INTERVALS AFTER INOCULATION (ALL PROPHYLACTICS) FOR FOUR QUARTERS

Quarter (onset of poliomyelitis)	1–28 day interval			29–84 day interval		
	Inoculations	Cases	Rate per 100,000	Inoculations	Cases	Rate per 100,000
Jan.–Mar. ..	279,158	3	1·1	335,522	0	—
April–June ..	462,618	26	5·6	473,439	2	0·4
July–Sept. ..	273,191	22	8·1	353,828	16	4·5
Oct.–Dec. ..	352,509	9	2·6	303,368	4	1·3

provoking effect of recent inoculations is not influenced by age.

SEASONAL AND CALENDAR DIFFERENCES IN INCIDENCE OF PARALYTIC POLIOMYELITIS AFTER INOCULATION OF DIPHTHERIA AND PERTUSSIS PROPHYLACTICS

Table v shows the 1–28 day and 29–84 day rates per 100,000 inoculations of all prophylactics for the years 1951 (May onwards), 1952, and 1953. In each of these the 1–28 day rate was considerably greater than the corresponding 29–84 day rate—i.e., the provoking effect of recent inoculation was seen in each year.

Table vi shows the rates for cases with onset in the four quarters January–March, April–June, July–September, and October–December of 1952 and 1953. The ten cases occurring in 1951 were omitted from this comparison because records for the last two quarters only were available. In each quarter the 1–28 day rates exceeded those for 29–84 days, though the absolute levels and relative differences varied at different times of the year. The difference between the 1–28 day and 29–84 day rates was greatest in the 2nd quarter, April to June, and not in the quarter of the highest incidence of poliomyelitis, July to September. The striking difference in the 2nd quarter was not confined to June but was also seen in April and May.

The 1–28 day rates for all prophylactics together are not strictly comparable for different calendar years and seasons. The mixed diphtheria-pertussis prophylactics were increasing in popularity from 1951 to 1953, and during the last year of the study the alum-precipitated mixed prophylactic was being replaced by the alum-free mixed prophylactic. The prophylactics usually given for reinforcing doses had a different seasonal pattern of use from those given for primary courses, and in some areas inoculations of the mixed diphtheria-pertussis prophylactics were suspended in the summer. In consequence, the composition of the all-prophylactics total was not stable. Nevertheless, the same patterns appeared in the detailed tables that were prepared for separate prophylactics, and in particular the large difference between the 1–28 and 29–84 day rates for the April–June quarter.

TABLE VII—1952 AND 1953. INCIDENCE OF PARALYTIC POLIOMYELITIS IN A 4-WEEK PERIOD BASED ON (*a*) ENGLAND AND WALES NOTIFICATIONS 1–9 YEARS OF AGE, AND (*b*) CHILDREN INOCULATED AGAINST DIPHTHERIA OR PERTUSSIS IN COUNTY-BOROUGH CLINICS MORE THAN 28 DAYS BEFORE ONSET

Quarter (onset of poliomyelitis)	Rate per 100,000	
	E. & W. notifications 1–9 years of age	29–84 day after inoculation (C.B. clinics)
Jan.–Mar.	0·43	—
April–June	1·02	0·4
July–Sept.	4·07	4·5
Oct.–Dec.	1·86	1·3

The different seasonal use of prophylactics affects the 1–28 day rates at different times of the year but, if inoculations given more than 28 days before onset do not contribute to the subsequent incidence of poliomyelitis, then the 29–84 day rate is simply a measure of the risk of developing poliomyelitis in the general population in a particular period of time. Such a measure for all prophylactics together will be unaffected by the proportion of different prophylactics in this total, and should be similar to the incidence of paralytic cases in the general population of the same ages in England and Wales. The comparison is made in table VII, for which the average number of paralytic cases 1–9 years of age notified in a 4-week period in the four quarters of 1952 and 1953 combined were obtained from the Registrar-General's reports. The two series of rates exhibit similar seasonal patterns and are very similar in level considering the few cases on which the 29–84 day series was based. In no quarter did the difference between the rates for England and Wales for children 1–9 years of age and the 29–84 day rates based on the inoculation records approach statistical significance. Possible objections to this comparison are that the incidence of paralytic poliomyelitis may not be the same in children inoculated in local-authority clinics of large urban areas as it is in the whole child population of the country, and that the inoculated children do not form a constant proportion of each year of age from 1 to 9. On the information available it is impossible to allow for these factors, but their influence is probably small, and even if it were possible to correct for them the essential similarity in level and in seasonal pattern between the two series of rates would almost certainly remain.

ESTIMATES OF PROVOKING EFFECT OF PROPHYLACTIC INOCULATIONS

If, as seems likely, injections given more than 28 days before onset have no influence on the occurrence of subsequent illness, it is possible to estimate the risk of provoking paralytic poliomyelitis within the 1–28 day interval after inoculation. In table IV, taking all prophylactics together, it is seen that the incidence in the 29–84 day interval was 1·3 per 100,000, whereas the rate for the 1–28 day interval was 4·0 per 100,000. The difference between these rates, 2·7 per 100,000, is a measure of the provoking effect of recent inoculations. Put another way, one associated case of poliomyelitis developed for every 37,000 inoculations. The provoking effect thus measured varied from prophylactic to prophylactic and at different seasons. The following *approximate estimates* can be made of the risk associated with individual prophylactics for the whole period of the study, using the incidence of 1·3 per 100,000 as the expected rate in the absence of inoculation:

A.P.T. .. .. .. 2·1 per 100,000 inoculations (1 case per 48,000 inoculations)
P.T.A.P. .. .. .. 4·7 per 100,000 inoculations (1 case per 21,000 inoculations)
Formol toxoid and T.A.F. .. 0·1 per 100,000 inoculations (1 case per 1,000,000 inoculations)
Pertussis vaccine .. .. 0·6 per 100,000 inoculations (1 case per 170,000 inoculations)
Mixed diphtheria-pertussis (alum-precipitated) .. 6·7 per 100,000 inoculations (1 case per 15,000 inoculations)
Mixed diphtheria-pertussis (alum-free) .. 5·2 per 100,000 inoculations (1 case per 19,000 inoculations)

These estimates are derived from rates based on very small numbers of cases and must be used with caution.

Another method of assessing the effect of inoculations of diphtheria and pertussis prophylactics in provoking paralytic poliomyelitis is to estimate the number of cases observed during the study which could reasonably be considered to be directly attributable to inoculation. During the whole period of the study 68 cases of paralytic poliomyelitis were observed within 28 days after the 1,693,424 prophylactic inoculations given in the county-

TABLE VIII—1951–53. CHILDREN INOCULATED IN COUNTY-BOROUGH CLINICS: NUMBER OF CASES OF PARALYTIC POLIOMYELITIS 1–28 DAYS AFTER A PROPHYLACTIC INOCULATION

Age (yr.)	Observed	Expected at 29–84 day rates	Estimate of provoked cases (O–E)
Under 2	44	15	29
2–3	6	1	5
4	7	1	6
5–9	11	6	5
0–9	68	23	45

borough clinics (table IV). If the risk of developing poliomyelitis after these inoculations had been the same as in the 29–84 day period, only 23 cases would have occurred. The difference between the numbers observed and expected, 45 cases, represents the number provoked by injection which would otherwise not have appeared as paralytic poliomyelitis. This group of 45 was not evenly divided between the age-groups (table VIII). Since it has already been shown that the provoking effect of recent inoculations is not influenced by age, the large number of provoked cases in children under 2 years is presumably a reflection of the type of prophylactic used and of the concentration of immunisation round about the first birthday. None of the cases observed within 1–84 days after inoculation was in a child under 6 months of age—again largely a reflection of the small number of prophylactic inoculations given to children less than 6 months old.

During the period of the study reports were received for 362 children between 6 months and 2 years of age with paralytic poliomyelitis in the county boroughs and urban areas which provided records of inoculations in clinics. The estimate of 29 provoked cases represents therefore 8% of the total cases of paralytic poliomyelitis in these areas in this age-group. Our experience suggested that about 60% of the total inoculations in these areas were given in local-authority clinics, the remaining 40% being given by general practitioners. (This estimate was based on the proportion of paralytic cases occurring between 29 and 84 days after inoculation among children inoculated in clinics and by general practitioners. The 29–84 day period was selected because cases occurring during this period would have been unrelated to inoculation, and therefore uninfluenced by the particular type of prophylactic used.) Assuming the risk to children inoculated by general practitioners to be similar to that to children inoculated in clinics, 19 cases might have been provoked by general-practitioner inoculations in addition to the 29 provoked by local-authority inoculations—a total of 48. This may well be an under-estimate, since at this period the mixed antigens, the ones carrying the greatest risk, were used for a higher proportion of general-practitioner than of clinic inoculations, while the antigens with least risk were used in a greater proportion of clinic inoculations. The total estimate of 48 provoked cases represents about 13% of the cases under 2 years of age in the county boroughs and large urban areas between 1951 and 1953. If the proportion of provoked cases in England and Wales was similar to that for the areas making returns of injections, then about 170 of the 1308 paralytic cases in the whole country reported in children of 6 months to 2 years of age during the course of this study must have been due to provocation.

At older ages the provoked cases form a much smaller proportion of the total reported in these areas. For example, it is estimated that 5 cases were provoked as a result of local-authority inoculations at ages 5–9 years. Even if it is assumed that these were all in 5 and 6 year old children they form only 1·3% of the 383 cases reported in this age-group. The same assumption for general-practitioner inoculations would only raise the proportion to 2·2%.

RISK OF PARALYTIC POLIOMYELITIS AFTER SMALLPOX VACCINATION

In the whole period from May, 1951, to December, 1953, just under 150,000 vaccinations against smallpox were reported. No cases developed within 1–28 days of these vaccinations, 1 case developed in the interval 29–56 days afterwards, and none in the 57–84 day interval. There was no evidence, therefore, of a provoking effect due to this procedure.

SITE OF INOCULATION AND SITE OF PARALYSIS

When the risk of developing paralytic poliomyelitis after inoculation had been determined, the relation between the site of paralysis and the site of inoculation was investigated. This analysis concerned the 355 paralytic cases that occurred within twelve weeks after inoculation in all parts of England and Wales, with the exception of 17 cases which were excluded because either the site of inoculation or the site of paralysis was not recorded with sufficient accuracy. The children who developed paralysis before the completion of the primary course were included. The information obtained is given in table IX. The cases are divided into two groups: those which occurred 1–28 days after inoculation, and those which occurred 29–84 days after inoculation. Arm and leg inoculations are shown separately, and the site of paralysis is described in relation to the site of inoculation as "same only," "included," and "different." These terms are defined in a footnote to the table. There was a striking difference in the distribution of paralysis in the two groups. In those children in the 1–28 day interval who were inoculated in the arm, 67 out of 159 (42%) had paralysis in the inoculated arm and at no other site, compared with 9 out of 95 (9%) of the children in the 29–84 day group. A similar difference is seen for children inoculated in the leg. Among the different prophylactics the mixed alum-precipitated diphtheria-pertussis prophylactic stood out; 80% of the cases in the 1–28 day group inoculated in the arm with this prophylactic had paralysis confined to the inoculated arm. Though the number of cases was small, T.A.F., F.T., and plain pertussis vaccine did not appear to be entirely free from an association with

TABLE IX—1951–53. ENGLAND AND WALES: PARALYTIC CASES—ASSOCIATION BETWEEN SITE OF INOCULATION AND SITE OF PARALYSIS AT DIFFERENT INTERVALS BETWEEN INOCULATION AND ONSET OF POLIOMYELITIS *

Interval (days) and prophylactic	Arm inoculations				Leg inoculations			
	Same	In.	Diff.	No. of patients	Same	In.	Diff.	No. of patients
1–28 days:								
A.P.T.	24	19	28	71	9	2	3	14
P.T.A.P. ..	9	2	9	20	—	—	—	—
T.A.F. and F.T.	2	1	4	7	—	—	1	1
Plain pertussis	3	4	4	11	2	1	2	5
Mixed, with alum	24	2	4	30	24	12	4	40
Mixed, without alum	5	2	5	12	3	—	2	5
Smallpox vaccine	—	3	5	8	—	—	—	—
All prophylactics	67	33	59	159	38	15	12	65
29–84 days:								
A.P.T.	4	6	32	42	—	4	2	6
P.T.A.P. ..	—	—	9	9	—	—	—	—
T.A.F. and F.T.	1	3	12	16	—	—	—	—
Plain pertussis	—	1	9	10	—	—	1	1
Mixed, with alum	3	—	2	5	1	—	5	6
Mixed, without alum	1	2	3	6	1	1	4	6
Smallpox vaccine	—	1	6	7	—	—	—	—
All prophylactics	9	13	73	95	2	5	12	19

* 17 cases are excluded from this table because either sites of inoculations or sites of paralysis were not accurately recorded.
Same, paralysis at site of inoculation and at no other site.
In., included, paralysis at site of inoculation and at other sites.
Diff., different, paralysis at sites other than site of inoculation.

the site of paralysis. When these three prophylactics were added together, 7 of 24 children in the 1–28 day group had paralysis only at the inoculation site compared with 1 of 27 in the 29–84 day group. These observations confirm reports of earlier workers that a distinct relation exists between the site of recent inoculations of prophylactics and the site of paralysis.

CASES AFTER SUBCUTANEOUS INOCULATIONS

It has been reported that poliomyelitis with paralysis in the inoculated limb is less common when inoculations are given subcutaneously than intramuscularly. Subcutaneous inoculations were not given very frequently, but in 38 cases it was stated that the inoculations, all of which were given in the arm, were subcutaneous. 21 of the cases occurred 1–28 days after inoculation, and in 11 (52%) paralysis occurred at the site of the inoculation; 17 cases occurred outside the 1–28 day period and in 2 (12%) there was an association between the site of inoculation and the site of paralysis. The number of observations was small, but in the 1–28 day period after subcutaneous inoculation the proportion of cases in which there was an association between the site of inoculation and the site of paralysis was similar to that for all cases investigated. There is no reason to believe that a change to the subcutaneous route of inoculation would obviate the risk of paralysis occurring in the inoculated limb.

TECHNIQUES OF STERILISATION AND INJECTION

In 1952 and 1953 special attention was paid to the technique of sterilisation and injection. In clinics the usual practice was to inject a number of children with the same syringe but to use a separate sterile needle for each injection. The methods of general practitioners varied from boiling the needle and syringe immediately before use to storing them in spirit or disinfectant without sterilisation by heat at any time. From the records 15 cases were picked in which the syringe and needle were known to have been thoroughly boiled immediately before use and were unlikely therefore to have been contaminated with virus. In 3 cases the interval from inoculation to onset was outside the 1–28 day period and in 12 it was within 1–28 days. In the 3 cases outside the 1–28 day interval the site of paralysis was different from the site of inoculation. Of the 12 cases within the interval 10 had paralysis at the site of inoculation alone or at the site of inoculation and at other sites. This picture was similar to that for all cases investigated. The findings do not suggest that transmission of virus from one child to another via contaminated syringes is responsible for the provoking effect of inoculations.

MULTIPLE CASES

In 1953 2 examples of multiple cases were noted. In a municipal borough in East Anglia 2 children inoculated in the left arm with reinforcing doses of T.A.F. on the same day at the same clinic developed paralytic poliomyelitis 11 and 23 days later. Both had paralysis of the inoculated limb; one also had paralysis at other sites. In the period concerned—the 3rd quarter of the year—12 paralytic cases occurred in the town in children 0–15 years of age, and 3—the 2 mentioned and 1 other—had received inoculations 1–28 days before the onset of symptoms.

In a county borough in north-west England 3 children were given inoculations of A.P.T. in the right arm at different times during the same afternoon at the same clinic: 1 child was given a reinforcing dose and 2 were given inoculations in a primary course. They developed paralytic poliomyelitis, in which the paralysis was confined to the inoculated limb, 11, 11, and 18 days afterwards. During the same period—the 3rd quarter of the year—17 paralytic cases occurred in the town

TABLE X—1954 AND 1955. ENGLAND AND WALES: CASES OF POLIOMYELITIS WHICH OCCURRED WITHIN 12 WEEKS AFTER PROPHYLACTIC INOCULATIONS

Prophylactic	Paralytic			Non-paralytic			Total		
	1954	1955	1954 and 1955	1954	1955	1954 and 1955	1954	1955	1954 and 1955
A.P.T.	27	30	57	5	6	11	32	36	68
P.T.A.P.	3	8	11	—	5	5	3	13	16
T.A.F. and F.T. ..	4	5	9	—	6	6	4	11	15
Plain pertussis ..	11	6	17	3	1	4	14	7	21
Mixed, without alum	12	47	59	—	7	7	12	54	66
Smallpox vaccine ..	3	8	11	—	2	2	3	10	13
All prophylactics ..	60	104	164	8	27	35	68	131	199

in children 0–15 years of age, all between the end of the 1st week in July and the 3rd week in August. One other child had had an inoculation 1–28 days before the onset of symptoms. We do not know how to interpret these observations, but we did note in two other areas that a group of 3 or 4 cases 1–28 days after inoculation occurred within a short time of one another, though there was no association between the cases in so far as the inoculations were concerned.

Cases in Scotland

A similar investigation to that just described for England and Wales was made in Scotland, reports on the inoculations and on the clinical findings being submitted to the Department of Health by medical officers of health and clinicians. Altogether 19 cases were reported as having occurred within 12 weeks after inoculation. 13 of these occurred within 28 days after inoculation, and 11 of the 13 had paralysis of the inoculated limb with or without paralysis at other sites, compared with 4 of the 6 cases which occurred at the longer interval. Medical officers of health of the Large Burghs sent in records of inoculations given, but the number of cases, 8, in these burghs was too small for detailed analysis. So far as the information from Scotland went, however, there was no reason to suppose that the risk was different from that in England and Wales.

Cases in 1954 and 1955

The inquiry in England and Wales was continued in 1954 and 1955; but, instead of visits being made to

TABLE XI—1954 AND 1955. ENGLAND AND WALES: PARALYTIC CASES—ASSOCIATION BETWEEN SITE OF INOCULATION AND SITE OF PARALYSIS AT DIFFERENT INTERVALS BETWEEN INOCULATION AND ONSET OF POLIOMYELITIS *

Interval (days) and prophylactic	Arm inoculations				Leg inoculations			
	Same	In.	Diff.	No. of patients	Same	In.	Diff.	No. of patients
1–28 days:								
A.P.T.	8	5	12	25	1	—	—	1
P.T.A.P. ..	—	1	3	4	—	—	—	—
T.A.F. and F.T.	—	—	2	2	—	—	—	—
Plain pertussis	1	2	4	7	—	3	1	4
Mixed, without alum	6	3	11	20	3	3	2	8
Smallpox vaccine	—	2	2	4	—	—	—	—
All prophylactics	15	13	34	62	4	6	3	13
29–84 days:								
A.P.T.	1	4	22	27	1	2	—	3
P.T.A.P. ..	1	3	2	6	—	—	—	—
T.A.F. and F.T.	—	—	5	5	—	—	1	1
Plain pertussis	1	2	3	6	—	—	—	—
Mixed, without alum	1	2	16	19	2	4	1	7
Smallpox vaccine	1	—	4	5	—	—	—	—
All prophylactics	5	11	52	68	3	6	2	11

* 10 paralytic cases were excluded from this table because either sites of inoculation or sites of paralysis were not accurately known.

Abbreviations as in table IX.

TABLE XII—1954 AND 1955. ENGLAND AND WALES: PARALYTIC CASES IN CHILDREN INOCULATED IN ARMS—ROUTE OF INOCULATION (SUBCUTANEOUS AND INTRAMUSCULAR) AND SITE OF PARALYSIS IN RELATION TO SITE OF INOCULATION (EXCLUDING CHILDREN GIVEN SMALLPOX VACCINE)

Prophylactic and interval (days)	Subcutaneous				Intramuscular				Not stated			
	Same	In.	Diff.	No. of patients	Same	In.	Diff.	No. of patients	Same	In.	Diff.	No. of patients
1–28 days:												
A.P.T.	1	—	1	2	4	5	4	13	3	—	7	10
P.T.A.P.	—	—	—	—	—	1	2	3	—	—	1	1
T.A.F. and F.T.	—	—	—	—	—	—	—	—	—	—	2	2
Plain pertussis	1	—	—	1	—	1	2	3	—	1	2	3
Mixed, without alum	2	2	5	9	3	—	5	8	1	1	1	3
All prophylactics	4	2	6	12	7	7	13	27	4	2	13	19
29–34 days:												
A.P.T.	—	—	7	7	—	2	7	9	1	2	8	11
P.T.A.P.	—	—	—	—	—	2	1	3	1	1	1	3
T.A.F. and F.T.	—	—	—	—	—	—	2	2	—	—	3	3
Plain pertussis	—	1	—	1	1	1	2	4	—	—	1	1
Mixed, without alum	1	1	5	7	—	—	4	4	—	1	7	8
All prophylactics	1	2	12	15	1	5	16	22	2	4	20	26

Abbreviations as in table IX.

the areas where cases occurred, medical officers of health submitted details of the inoculations, and clinicians submitted reports on the clinical findings. No information on the number of inoculations given was obtained during these years. Reports were received for 164 paralytic and 35 non-paralytic cases in children 15 years of age or younger who developed symptoms within twelve weeks after inoculation. Alum-precipitated mixed diphtheria-pertussis prophylactic was not mentioned in connection with any of the cases, but 66 cases were in children given mixed prophylactic without alum (table X). The relation between the site of inoculation and the limb paralysed is shown in table XI for the 154 paralytic cases for which complete information was available. For children injected in the arms the picture was similar to that found in the 1951–53 study—namely, an excess of short-interval cases had paralysis in the inoculated limb. For children injected in the legs there was no difference between the short-interval and the long-interval cases, but the numbers were small. The effect of alum-free mixed prophylactic appeared similar to that of A.P.T. and, though a strict comparison is not possible, it may have been less than the effect of the alum-precipitated prophylactic used in 1951–53. The finding that the subcutaneous route of inoculation was no safer than the intramuscular route was confirmed (table XII).

Discussion

The results clearly show a frequent association between the site of inoculation and the limb paralysed in children who developed poliomyelitis within four weeks after inoculation against whooping-cough or diphtheria. They also show an increase directly attributable to inoculation in the number of paralytic cases which occurred. In children of the ages at which reinforcing doses are usually given the contribution to the total incidence was comparatively small; in 1951–53 probably about 2% of the paralytic cases in county boroughs at these ages were attributable to inoculation. In children of the age at which primary courses are usually given the contribution was substantial; in 1951–53 perhaps 170 of the 1308 paralytic cases in England and Wales in children between 6 months and 2 years of age were causally related to the injection of diphtheria or pertussis prophylactics. Contrary to what might reasonably be expected the risk was at least as great in April, May, and June, when the incidence of poliomyelitis is usually low, as in July, August, and September, when the incidence is usually higher.

It is impossible to interpret the differences between the provoking effect of the different prophylactics. P.T.A.P. causes less local reaction than A.P.T. but has as great a provoking effect as A.P.T., if not greater. Formol diphtheria toxoid and plain pertussis vaccine when given separately are comparatively safe; when mixed they are by no means free from risk, even when no alum is added. The findings with mixed alum-free prophylactics differ from those of Rhodes (1953) and Peach and Rhodes (1954) in Canada, who found no causal relation between these prophylactics and paralytic poliomyelitis.

The inquiry has thrown little fresh light on the mechanism of provocation. The fact that in some of the cases where the paralysed limb was the site of the preceding inoculation the syringes were boiled immediately before use lends no support to the supposition that virus was transmitted from child to child via syringes. The statement frequently made that subcutaneous inoculations are safer than intramuscular inoculations also received no support. Bodian (1954), in studies on cyno-

TABLE XIII—1951–53. ENGLAND AND WALES: CASES IN WHICH PARALYSIS WAS LIMITED TO THE LAST INOCULATED LIMB—DISTRIBUTION OF INTERVALS FROM LAST INOCULATION TO (*a*) ONSET AND (*b*) FIRST PARALYSIS IN CASES OCCURRING 1–28 DAYS AFTER INOCULATION

Interval (days)	Inoculation to onset of first symptoms (no. of cases)	Inoculation to appearance of first paralysis (no. of cases)
1	0	0
2	1	0
3	1	0
4	1 (6)	0
5	0	1
6	2	1
7	1	0
8	3	0
9	4	2
10	9	2
11	15 (48)	5
12	8	9
13	6	6
14	3	6
15	4	8
16	3	5
17	6	5
18	9 (33)	10
19	4	3
20	3	10
21	4	5
22	2	3
23	4	3
24	4	5
25	2 (18)	2
26	2	2
27	2	2
28	2	2
29		2
30		2
31		3
32		1
All intervals	105	105

molgus monkeys experimentally infected with poliomyelitis virus by the intracardiac route and injected with a variety of inocula, obtained results similar to ours in children. He postulated that the peripheral injection rendered the blood-vessels of the corresponding segment of the spinal cord more easily penetrable by virus circulating in the blood-stream about the time the injection was made. He observed that there was an association between the site of injection and the site of paralysis, even when the living virus was inoculated as long as two weeks after the peripheral injection had been given. We found that the cases occurring within 28 days of their last injection were not evenly distributed in this period. Among this group those most likely to have been provoked by injection were the 105 in which the paralysis was limited to the inoculated limb ("same" category of table IX). The distribution of intervals from injection to onset of first symptoms for these children is shown in table XIII. Only 6 (6%) had intervals of 7 days or less. 48 (46%) had intervals of 8–14 days, 33 (31%) 15–22 days, and 18 (17%) intervals of 22–28 days. The detailed distribution showed the peak in the 10, 11, and 12 day intervals, though there seemed to be a second peak about the 17th and 18th days. This second peak might suggest that in children, as in artificially infected cynomolgus monkeys, the inoculation both activated an existing latent infection and increased susceptibility to paralysis resulting from an infection subsequently incurred. This suggestion must be treated with caution. Some of the children we observed had a typical biphasic illness with onset several days before the appearance of paralysis, whereas in others paralysis was one of the first signs. Table XIII therefore also shows for the same 105 children the intervals from inoculation to the appearance of first paralysis in each case. These intervals were in general longer than the corresponding intervals to the onset of first symptoms, and their distribution showed only one extended peak, ranging from 12 to 20 days. It may be that the two peaks of the distribution of intervals to onset were in part an artefact produced by the two types of onset recognised.

Apart from the second peak, the intervals from inoculation to onset resemble the incubation period of the natural disease, as determined by Sartwell (1952). The inoculation-onset interval in our inquiry is not the same as that observed when living virus has been inoculated. In the postvaccinal cases in the United States of America (Langmuir et al. 1956) and in the earlier observations by Leake (1935) the usual interval from inoculation to onset was about 6 days—much shorter than the average intervals we observed.

Summary

Between 1951 and 1953 all cases of paralytic poliomyelitis in children in England and Wales were investigated when the patients had had an injection of diphtheria or whooping-cough prophylactic or smallpox vaccine within 12 weeks before the onset of symptoms. Altogether 355 paralytic cases were investigated (1 child given inoculations of different prophylactics at the same time being counted as 2 cases). Of the 222 cases in children who had completed a primary course of inoculations or had been given reinforcing doses, 132 developed paralysis 1–28 days after inoculation. These cases were concentrated around the 11th and 17th days after inoculation.

Records of numbers of inoculations given during the period of the study were collected from children in county boroughs, and certain other large urban areas, and the paralytic cases occurring in these areas in clinic-inoculated children were related to the number of inoculations given. It was estimated that in these areas in 1951–53 about 1 in 37,000 inoculations precipitated paralytic poliomyelitis. There was good evidence that the risk did not extend beyond about one month after the inoculation, and that a series of inoculations had no cumulative effect. The risk varied with the nature of the prophylactic used, being greatest with alum-precipitated diphtheria-pertussis and least with T.A.P. and F.T. A.P.T., P.T.A.P., and mixed non-alum-precipitated prophylactics occupied an intermediate position, and plain pertussis vaccine appeared relatively safe. There was no evidence of a provoking effect due to smallpox vaccine. It was estimated that about 13% of paralytic cases in children 6 months to 2 years of age in the county boroughs and large urban areas were causally related to inoculation. This proportion would represent about 170 cases provoked by inoculation in children in this age-group in England and Wales between 1951 and 1953. In children about 5 years old, the age when reinforcing doses are usually given, cases provoked by inoculation probably formed only 2% of the total. The period of highest risk was the second quarter of the year.

A clear relation between the site of inoculation and the site of paralysis was demonstrated.

No evidence was found to support the belief that children said to have been inoculated subcutaneously were less liable to develop paralysis than children said to have been inoculated intramuscularly.

There was no evidence that virus was being transmitted from child to child via syringes.

A similar inquiry in Scotland gave concordant results, though the number of cases was small.

In 1954 and 1955 a modified investigation was made, and the relation between site of inoculation and site of paralysis was again demonstrated.

The mechanism by which inoculation acts is still a matter for conjecture, but the evidence submitted in this report leaves no doubt that it genuinely predisposes to the occurrence of paralysis and does not act merely, as is sometimes supposed, by determining the site of paralysis. It is clear that the findings—the risk involved in the use of different vaccines and toxoids, the seasonal variation in the risk, and the apparent similarity in risk attached to subcutaneous and intramuscular injections—raise practical problems which will have to be borne in mind in the inoculation of children with whooping-cough vaccines and diphtheria toxoids, singly or in combination.

The inquiry was planned in consultation with the Advisory Committee on Research of the Society of Medical Officers of Health. It could not have been carried out without the collaboration of all medical officers of health in England, Wales, and Scotland and the help of the hospital physicians and general practitioners who looked after the cases included in the inquiry. The Committee wishes to record its thanks to all medical officers of health, particularly to those in county boroughs and other urban centres who submitted weekly records of the numbers of injections given, and to the hospital physicians and general practitioners who submitted clinical records. They also wish to thank Dr. G. R. Baxter, Dr. W. Fielding, Dr. B. J. Griffiths, and Prof. A. B. Semple, who investigated the cases in Leeds, Sheffield, Manchester, and Liverpool. A further debt of gratitude is due to Dr. Daniel Thomson, of the Ministry of Health, and Dr. I. A. Bolz (now Dr. S. A. Boyd), late of the Public Health Laboratory Service, who assisted the secretaries in the collection of clinical and epidemiological information.

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EPILEPSY AND MENSTRUATION

THE RÔLE OF WATER RETENTION

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IT has long been suspected that a direct relationship exists between epileptic seizures and menstruation. Gowers (1881), Spratling (1904), and Turner (1907) noted that, in some women, attacks were more common at the menstrual period or shortly before it, and many physicians accept the association as an established fact. More recent workers (Dickerson 1941, Marchand and de Ajuriaguerra 1948, Bailey 1953, Almqvist 1955), however, have refuted these claims. In view of this divergence of opinion we investigated a small number of outpatients, and our results agreed with the earlier workers; therefore we tried to find the reason for this relationship.

In four years epilepsy was diagnosed in 148 outpatients aged more than 12 years; 113 were considered to have idiopathic or centrencephalic epilepsy, and in 35 the fits were symptomatic. For two to four months in 42 females the seizures and menstruation were recorded. Information about the premenstrual syndrome and pregnancy was also collected. The following conclusions were reached:

(1) 63% of the female epileptics reported more fits during menstrual bleeding or during the twenty-four hours immediately preceding it.

(2) Statistical proof was not possible, but this relationship seemed to be equally common in both idiopathic and symptomatic groups; the type of idiopathic epilepsy did not play a part.

(3) The premenstrual syndrome was no more common in epileptics than in healthy women, and it seemed to be as common in those with as in those without a menstrual aggravation of seizures.

(4) There was no constant relationship between pregnancy and epilepsy, whether there was a menstrual aggravation of seizures or not, but the information was retrospective.

Our findings concerning catamenial epilepsy merely substantiate those of earlier workers. Of much greater importance and support, however, is the statistical evidence produced by Laidlaw (1956). If this peculiarity of the female epileptic is accepted, it is of interest to consider the possible ætiological factors. The menstrual cycle, however, is highly complex and so we discuss only four likely ones.

(1) The *premenstrual syndrome* includes psychiatric disturbances which may be considered as aggravating factors in some epileptics, and the increased suicide-rate during the luteal phase of the cycle (MacKinnon and MacKinnon 1956) indicates mental instability at this time. De Macedo (1950) has discussed the psychoanalytical aspects of the woman with menstrual epilepsy and believes that they are responsible for it; his conclusions cannot, however, be considered seriously.

As already noted, we found no correlation between the premenstrual symptoms and the incidence of fits, which, in some cases, occurred more commonly with the periods than before them. Furthermore there was no association with the amount of menstrual pain, although Muskens (1928) claimed that the epilepsy improved after relief of the pain.

(2) Since *biological events at times may be rhythmic* (Hoffman 1926, Ask-Upmark 1955), Almqvist (1955) has proposed that this fact, rather than menstrual factors, is responsible for the apparent catamenial correlation. Laidlaw (1956), however, indicates the fallacies of this argument.

(3) Changes in the *blood-cholesterol* level have been reported in the premenstrual state (Okey 1925) and just before an epileptic seizure (Robinson et al. 1927, Gosden et al. 1929, McQuarrie et al. 1933). We therefore investigated a few epileptic and healthy females; but, since the individual variations were considerable, accurate analysis was impossible. We did, however, observe that these variations did not occur in the oöphorectomised female (table I, case 4). Perhaps the reported premenstrual and pre-ictal hypocholesterolæmia, if confirmed, is the result of a common mechanism.

(4) *Water retention* at and before menstruation was first observed by Heilig (1924), and Thorn et al. (1938) found that it was due to a disturbance of sodium metabolism. Since it is well known that an excess of body-water will produce fits in an epileptic (McQuarrie 1929, Teglbjaerg 1936), it has been assumed that this is the mechanism underlying menstrual epilepsy. The recent use of the diuretic acetazolamide ('Diamox') as an anticonvulsant has further strengthened this belief. We

TABLE I—^{22}NA STUDIES IN HEALTHY PEOPLE

Case no.	Sex	Age yr.	Biological half-life of ^{22}Na	Total exchangeable sodium (m.eq. per kg. of body-weight)	Maximal increase in body-weight (lb.)	Comments
1	F	26	9	44·4–48·0	3·5	Fig. 1
2	F	31	16	42·2–46·0	7·0	..
3	F	34	10	38·0–46·5	4·0	..
4	F	44	10	36·4–39·0	1·5	Bilateral oöphorectomy and hysterectomy
5	M	28	10	37·4–39·0	2·5	..
6	M	42	9	40·0–41·5	1·5	..

therefore investigated body-weight, sodium metabolism, and total body-water in epileptic and in healthy people.

Body-weight

The accumulation of menstrual œdema may be measured crudely by observing changes in body-weight. We investigated 24 persons: 14 epileptics, of whom 12 were female (7 with and 5 without menstrual aggravation) and 2 male; 8 normally menstruating females; and 2 normal males. Each person was weighed daily at the same time for a minimum of thirty days. The epileptics continued to take their drugs, and both they and the controls consumed a normal diet and indulged in their usual occupational and social activities. Each of the healthy females and all but one of the epileptics menstruated during the study; only 3 of the epileptics did not have fits. Both the healthy and the epileptic females showed considerable variations in weight during their menstrual cycles, the mean changes being 3·75 lb. and 3·5 lb. respectively; the increases above their lowest body-weight were 1·8–3·3% and 1·5–4·0% respectively. As expected, the 4 males showed no great variation.

The changes in body-weight were thus of the same order in the epileptics and the healthy people, and there was no difference between those with and those without a menstrual exacerbation of fits. Furthermore, when body-weights and fits were charted, there was no correlation between the greatest increase in weight and the increased incidence of seizures. Nor was there an association between the degree of premenstrual distress and the œdema, which, although considerable, may occasionally remain symptomless (Thorn et al. 1938, Lamb et al. 1953). It therefore appears that premenstrual œdema, measured by body-weight changes, does not play a primary rôle in the pathogenesis of menstrual epilepsy in the small group observed.

Sodium Metabolism

Information about serum-electrolyte changes during the menstrual cycle is conflicting. Thorn et al. (1938) and Phillips et al. (1952) have reported cyclical patterns, but Danforth et al. (1946) and Newman (1955) deny their existence.

Material

5 healthy people and 7 epileptics (2 from epileptic colonies) were studied; their details are given in tables I and II respectively. The classification of epilepsy used was that suggested by Symonds (1954), and the severity was graded according to the method reported by Ansell and Clarke (1956): grade I less than one fit a month, grade II from one a month to not more than one a week, and grade III more than one a week. One of the healthy women had undergone bilateral oöphorectomy (table I, case 4). The others were either members of the research team or physiotherapists; menstruation in the females was normal.

Method

The epileptics were maintained on a fixed diet of known sodium content (800 mg. daily) made up of protein 1 g. per kg. of body-weight, fat 30% of the total calories, and the remainder carbohydrates; the sodium intake was increased to a daily total of 3 g. with sodium chloride. The epileptics were allowed normal activity. After three days' stabilisation early-morning daily weights and fluid intake and output balances were charted, as well as a careful record of all fits. Two patients who had severe epilepsy were kept on a small dose of phenobarbitone, but the other 5 received no treatment. The healthy controls took their normal diet and were weighed daily at 9 A.M. A fluid balance was not undertaken on them. Bodily excesses were avoided during the period of study.

The procedure thereafter was the same for the two groups. A single tracer dose of ^{22}Na (15–30 μC) was given, and the rate of its turnover in the body was observed by the method described by Veall et al. (1955). The total body radioactivity was measured and urine collected at the same time every day, and each person was observed for at least thirty days. The simplicity of this technique reduced the labour of the investigation considerably because a daily count of total body activity and simultaneous estimations of the total exchangeable sodium by examination of the urine were alone necessary.

TABLE II—^{22}NA STUDIES IN EPILEPTICS

Case no.	Sex	Age yr.	Type of epilepsy	Menstrual aggravation	Biological half-life of ^{22}Na	Total exchangeable sodium (m.eq. per kg. of body-weight)	Increase in weight (lb.)	Comments
7	F	25	Major (grade I)	0	15	36·0–40·0	3	..
8	F	26	Major (grade III)	0	14	36·0–40·0	4·5	Did not menstruate
9	F	27	Major (grade III)	+	21	36·0–41·0	5	..
10	F	31	Major (grade II)	+	16	34·2–37·5	4	Fig. 2
11	F	22	Major (grade I)	0	10	36·0–39·0	5	..
12	F	36	Major (grade I, minimal III)	+	10	41·0–44·3	8	..
13	M	20	Major (grade III)	–	11	41·0–42·5	2	Fig. 3

Results

The essential data on the 13 persons are given in tables I and II.

In the 2 healthy males, cases 5 and 6 (table I), serial measurements of total body radiation after the dose of ^{22}Na showed that the biological half-life was ten and nine days respectively. When the percentage of the dose retained was plotted against the day of study, a straight line was obtained in each case. Veall et al. (1955, fig. 3) found the same thing, and their method of depicting the results has been in part adopted here (figs. 1–3). The 3 healthy females (table I), however, showed a wider variation in the biological half-life, and the biological decay curve showed a flattening before and during menstruation rather than a straight line (fig. 1). The days of flattening were not the same in all the cases. The range of total exchangeable sodium was greater in the menstruating females, being maximal premenstrually. The findings in the oöphorectomised female were much like those in the men, and the decay curve was straight (table I, case 4).

In a youth who had had epilepsy six years (table II, case 13) the ^{22}Na biological half-life was eleven days and the decay curve a straight line; other values were the same as in the healthy people. Seizures under observation had no effect on the decay curve. One of the 6 epileptic

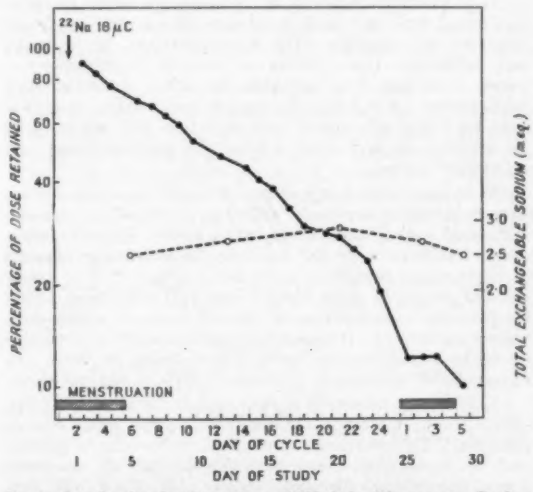

Fig. 1—Case I: showing decay curve of ^{22}Na in healthy woman. During first menstrual period equilibration had not taken place, but premenstrual and menstrual changes obvious in second.

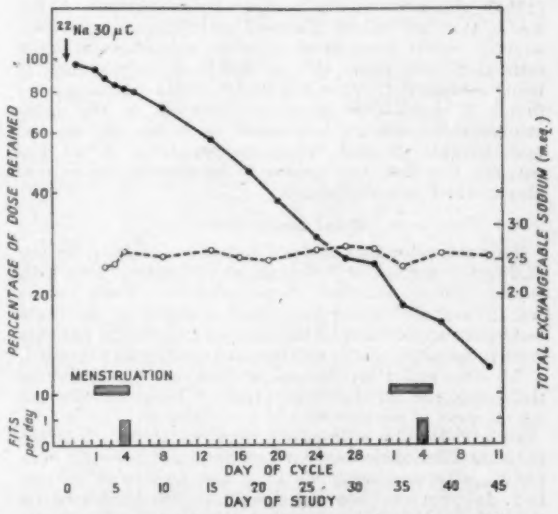

Fig. 2—Case 10: showing decay curve, menstrual periods, and seizures in epileptic. Findings shown best in second menstrual period.

females did not menstruate (table II, case 8), but the remaining 5 all showed a slowing in the curve of total body activity identical with that in the controls (fig. 3).

The changes in body-weight (tables I and II) were the same as those already mentioned.

Conclusions

The pattern of sodium metabolism shown by this technique was the same in the healthy as in the epileptic females (tables I and II) and could be readily distinguished from the male type. The changes in the female appear to be directly related to ovarian function because the findings in the oöphorectomised female were the same as in the male. There were no obvious differences among the female epileptics; it thus appears that an alteration of sodium metabolism with consequent retention of water, before and during the menstrual period, was not a prime factor in the pathogenesis of menstrual epilepsy, so far as the patients reported here are concerned.

Our results parallel those of Thorn et al. (1938) who were using the more laborious technique of balance studies in healthy males and females. Wilson et al. (1954), who estimated the total exchangeable sodium by a single observation using the short-lived ^{24}Na, have

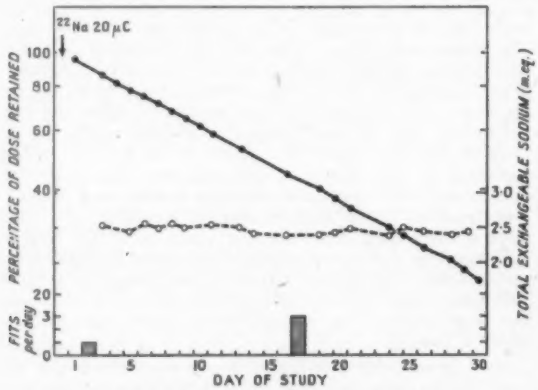

Fig. 3—Case 13: showing decay curve in epileptic man.

shown that the two methods are strictly comparable. Furthermore, with the same method Edelman et al. (1954) obtained results comparable with ours. We realise that the results obtained with ^{22}Na are probably slightly higher than those of other workers, who have estimated that about 82% of the total body-sodium is being measured (Forbes and Perley 1951). Although we found a slight but consistent increase in the total exchangeable sodium (expressed as m.eq. per kg. of body-weight) at and before menstruation in all the persons, this does not appear to be outside the normal range, which is considerable.

Total Body-water

This was estimated in the 7 epileptics (table II) by the antipyrine method of Soberman et al. (1949). Two with severe epilepsy received phenobarbitone. Each female was investigated at the same time in the menstrual cycle but never at the time of bleeding. Since all the patients were in hospital, relatively standard conditions prevailed.

All the epileptics had a normal total body-water (table III), and those with and those without a menstrual aggravation of seizures showed no difference.

In addition the estimations were repeated in 5 of the patients after their seizures had been satisfactorily controlled with acetazolamide in 3 and phenytoin sodium in 2. In none was there any significant difference between the two readings, showing that the control of epileptic seizures does not necessarily depend on an alteration in body-water when the fluid balance is normal. The importance of this finding in relation to the anticonvulsant action of acetazolamide has already been indicated (Ansell and Clarke 1956).

TABLE III—TOTAL BODY-WATER IN EPILEPTICS
(Normal = 39·3–57·9% of body-weight)

Case no. (see table II)	Total body-water (litres)	% of body-weight	Treatment
7	3·1	50·0	Phenobarbitone gr. 1 t.d.s.
8	2·94	51·4	None
9	2·84	47·0	None
10	3·4	48·0	None
11	3·1	56·0	None
12	2·88	46·0	None
13	3·05	51·0	Phenobarbitone gr. 1 t.d.s.

Discussion

Of the many changes that take place during the menstrual cycle the retention of water that precedes the bleeding (Thorn et al. 1938) seems to explain the menstrual aggravation of epileptic seizures most readily. Like Greene and Dalton (1953), most physicians have compared this phenomenon to the water-vasopressin ('Pitressin') test used occasionally to precipitate fits, and Schwob et al. (1948) mention the possible connection between the attacks and premenstrual œdema. In the patients whom we investigated, however, this assumption could not be confirmed. Thus, by studying the changes in body-weight and the sodium metabolism in epileptics, we could not detect any difference between them and the controls. Furthermore the epileptics with menstrual seizures differed in no way from those without them. Arising from these conclusions are several points to be discussed.

(1) It is clear that premenstrual œdema and the state produced by the excessive water load necessary for the water-vasopressin test are not comparable. Premenstrual œdema is produced by the retention of sodium, probably in the extracellular space, if a comparison with similar events during pregnancy (Chesley 1943, Preedy and Aitken 1956) is valid, whereas the state produced by overloading with water is a form of intoxication, with generalised tissue hydration and swelling of cells (Helwig et al. 1935, Peters 1944, Wynn 1956). Seizures in their presence are therefore not necessarily due to the same cause.

(2) If premenstrual œdema were the primary cause of menstrual fits, the peak incidence of seizures might be expected to coincide with the maximum of œdema; but, although the attacks commonly occurred when water retention was greatest, in some patients they persistently did not (fig. 2). Furthermore other epileptics with an equal amount of salt retention and œdema had no seizures at any time during the premenstrual and menstrual period.

(3) It has been shown experimentally that the seizure threshold varies inversely with the extracellular concentration of sodium (Woodbury et al. 1950). Unfortunately our investigations do not indicate the exact whereabouts of the sodium retained in the body; but, if it is extracellular, as seems most likely (Greenhill and Freed 1940), the premenstrual increase of seizures is incompatible with these conclusions. It was found technically impracticable to make simultaneous serial observations on both the extracellular space and the fate of ^{22}Na in our patients.

(4) If water retention is responsible for menstrual fits, other kinds of œdema should increase the likelihood of seizures. Information about this, however, is scanty, and fits in cardiac, renal, and hepatic œdema are often due to the primary disease. In any case, it is known that œdemas due to various causes represent different metabolic defects affecting the distribution of sodium and

water (Farber and Soberman 1956), and a comparison should not be drawn.

(5) Water retention at the time of ovulation has been observed by Thorn et al. (1938), Geiringer (1951), and Greene and Dalton (1953). It is important to know if seizures are common at this time; but this is not yet known, the difficulty of determining the precise time of ovulation being an obvious handicap. We have not yet found an epileptic with predominantly ovulatory epilepsy; and, so far as we could detect, none of our patients experienced the ovulatory tension state (*Mittelwahn* of Geiringer 1951).

(6) We have not had the opportunity of investigating either healthy people, or epileptics with a severe degree of water retention in whom seizures would be more likely if œdema caused them. The cases described by Thomas (1933, case 2) and McCullagh (1941), however, had the features of increased intracranial pressure but no seizures. That menstrual œdema may affect the brain, therefore, cannot be denied but seems to be very rare.

(7) The therapeutic aspects of our conclusions are of interest because it has been suggested that, since acetazolamide promotes diuresis and increases the output of sodium it should be used in menstrual epilepsy to lessen the amount of sodium and water retained; for the same reason it has been used in the premenstrual syndrome (Greenblatt 1955). In 2 epileptic and 1 healthy women we observed this effect when acetazolamide was given premenstrually and it was maintained for three days. But with continued administration the menstrual retention of sodium was not necessarily altered, and the over-all decay curve and the level of total exchangeable sodium were not disturbed. The effect on the patients' seizures could not be assessed, but from clinical experience acetazolamide is known to benefit some epileptics when given premenstrually (Ansell and Clarke 1956).

If our present conclusions about the relationship of seizures to the menses are correct, therefore, acetazolamide cannot be acting entirely by affecting the premenstrual retention of salt and must have another mode of action. Recent work (Millichap et al. 1955, Millichap 1956) indicates that its anticonvulsant action is probably on carbonic anhydrase of the brain, and our findings give some support to this.

If water retention is not directly responsible for the premenstrual and menstrual exacerbation of epileptic seizures, it seems possible that the complex hormonal changes that produce it (Thorn et al. 1938, Gillman 1942, Freedy and Aitken 1956) may play a prominent part.

Summary

The findings in a few female epileptics support the contention of earlier workers that seizures are more common just before and during the menstrual period.

Some of the possible ætiological factors are discussed.

By studying the body-weight, the premenstrual retention of water, and the total body-water, it was found that a disturbance of water storage was not primarily responsible.

We wish to thank Dr. J. E. S. Bradley for providing the ^{22}Na and for his invaluable advice on its application in this study.

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CATAMENIAL EPILEPSY

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SINCE Gowers (1881) and others observed a menstrual exacerbation of fits, it seems to have been tacitly accepted that in some women there is some connection between epilepsy and the menstrual cycle. Although reports on comparatively small series have appeared from time to time, the subject aroused little interest until Almqvist (1955), at the end of a long and careful statistical survey, denied the existence of catamenial epilepsy.

The elucidation of factors influencing the occurrence of seizures is basic to the proper understanding and to the rational management of the epilepsies. To establish facts about one of these factors has more than intrinsic interest. It is only on the basis of fact that hypotheses can be proposed and tested, and from this basis that attempts can be made to advance, however little, towards a solution of the enigma of the epilepsies, which is not so much why people have fits but why they have them when they do.

I report here the main results of an analysis of a very large number of fits (detailed results and discussion of the methods of the analysis will be published elsewhere). These results present very strong statistical evidence of the existence of catamenial epilepsy.

Material

An Edinburgh survey (1954–55 unpublished), in which 73 outpatients recorded 1442 fits in 415 menstrual cycles,

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showed a statistically significant relationship between fits and menstruation. The figures were broken down according to age, frequency and severity of fits, type of fit, presumed ætiology, school record, and present intellectual and affective status. Although the series was not large enough for such a breakdown to be statistically significant, there was a strong suggestion that the catamenial influence which had been demonstrated, though it might be affected by certain of these factors, was not wholly determined by any one or more of them. It was therefore felt that it would be useful to analyse the fits of a group of epileptic inpatients and justifiable to apply the findings from such a special group to the general epileptic population.

At St. Faith's, a hospital for epileptics in Brentwood, Essex, records of both fits and menstruation have been kept for twenty-five years. The records of the 50 presently menstruating women, who had been at the hospital longest, were considered; there was no other selection.

Major fits only were analysed and, owing to the method of recording, 5 or more fits were counted as 5 fits. Minor fits were excluded both because of the difficulty of recording such fits accurately and because of the confusion surrounding the meaning of the term.

Method of Analysis

The first day of menstruation was called *plus 1*, the following day *plus 2*, the day before the onset of bleeding *minus 1*, and so on until 25 cycle-days from *minus 15* to *plus 10* were defined. The number of fits on each of these cycle-days was counted and expressed as a percentage of the expected number of fits per cycle-day obtained by calculation from the average daily number of fits. These percentages for the 25 cycle-days (see table and figure) show the catamenial pattern of incidence of fits.

It is postulated that the physiological changes associated with the menstrual cycle, especially ovulation, influence the occurrence of seizures. In this series there were phases when menstruation was comparatively regular, but there were others which showed an irregularity which was so gross that it was clearly outside the normally wide range of physiological variation. Since it appeared reasonable to assume that there would be a higher proportion of physiological ovular cycles during the regular than the irregular phases, an arbitrary method of selecting regular cycles was defined.

When, in a sequence of three or more cycles, the menstrual type differed by 6 days or less from the mean type for the sequence, the cycles in that sequence were designated as regular cycles. The cycles at the beginning and end of each sequence were excluded, and those remaining were classified as selected regular cycles (S.R.C.S).

The S.R.C.S were then considered separately. The fits per cycle-day were again expressed as a percentage of the expected fits (see table), and these percentages were plotted (see figure) to show the catamenial pattern of incidence of fits during phases of comparatively regular menstruation. The pattern for regular cycles was compared with that for the whole series because it was felt that, whereas one could assume that most of the S.R.C.S were physiological, it would not be justifiable to assume that any particular proportion of the other cycles were not.

CATAMENIAL DISTRIBUTION OF FITS

Cycle-day	All cycles		Selected regular cycles	
	Total fits per cycle-day	Actual (as % of expected) fits per cycle-day	Total fits per cycle-day	Actual (as % of expected) fits per cycle-day
−15	840	94·2	306	91·2
−14	985	110·4	346	103·1
−13	850	95·3	294	87·6
−12	794	89·0	312	93·0
−11	797	89·4	282	84·0
−10	784	87·9	299	89·1
−9	845	94·7	263	78·4
−8	777	87·1	234	69·7
−7	720	80·7	235	70·0
−6	765	85·8	262	78·1
−5	742	83·2	271	80·8
−4	810	90·8	282	84·0
−3	925	103·7	336	100·1
−2	914	102·5	317	94·5
−1	1107	124·1	435	129·6
+1	1246	139·7	488	145·4
+2	1184	132·8	453	135·0
+3	1180	132·3	384	114·4
+4	1036	116·2	353	105·2
+5	1122	125·8	426	126·9
+6	1089	122·1	426	126·9
+7	952	106·7	343	102·2
+8	1076	120·6	377	112·3
+9	980	109·9	338	100·7
+10	991	111·1	340	101·3
Average	891·9 (S.D. 30·1)		335·6 (S.D. 18·0)	

Results

Fifty patients had 33,468 fits in 939 patient-years. During this time there were 9293 menstrual cycles with 23,511 fits during the 25 cycle-days (−15 to +10). There were 3620 S.R.C.S and 8402 fits during S.R.C. cycle-days.

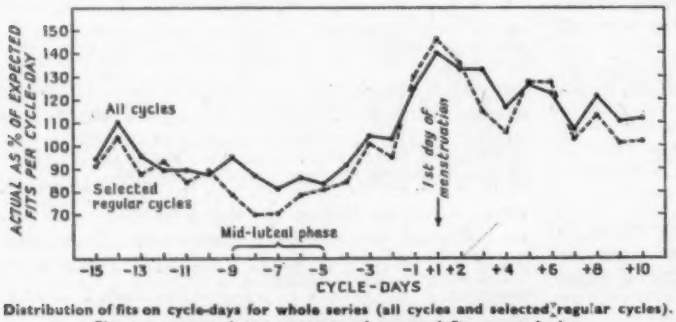
Comparison of the accompanying figure and table shows that, when all cycles are considered, there is an increased incidence of fits immediately before, during, and after menstruation, with a reduced incidence between days −13 and −4 inclusive, and that during phases of comparatively regular menstruation (S.R.C.) the same general pattern is maintained; but that, whereas there is comparatively little alteration in the menstrual exacerbation, there is a significant accentuation of the luteal reduction, particularly during the mid-luteal phase from days −9 to −4 inclusive. Analysis shows not only that nearly all the percentages for individual cycle-days are significant but also that the odds against the comparatively regular form of the graphs being due to chance are enormous.

An analysis of individual catamenial patterns of incidence of fits is not included in this report, but it shows the following facts:

(1) Although 14 patients (28%) showed no significant catamenial influence, the remainder (72%) showed clear evidence of a relationship between the incidence of their fits and the menstrual cycle.

(2) Of those patients showing this latter relationship almost all showed a definite mid-luteal reduction in fits, although the phase of the cycle showing an exacerbation varied, and there might be one or more maxima in any individual graph.

(3) The accentuation of the catamenial



Distribution of fits on cycle-days for whole series (all cycles and selected regular cycles). Fits are expressed as percentage of expected fits per cycle-day.

pattern when S.R.C.s were considered, which was seen in the whole series, was also evident for individual patients.

Discussion

In this analysis no attempt was made to correlate a rhythm of fits with an assumed rhythm of the menstrual cycle. The occurrence of fits was related directly to the first day of menstruation, and a catamenial distribution was demonstrated, despite variations in menstrual pattern. The analysis shows that, in a series of epileptic inpatients menstruation does influence the pattern of fits. In view of the comparable results obtained from unselected outpatients there seems to be no good reason why this influence should not operate in the epileptic population as a whole.

It is usually understood that, if there is such a thing as catamenial epilepsy, there is something about menstruation which increases the proclivity to fits. Contrariwise, the catamenial patterns, especially the mid-luteal reduction in incidence, suggest that there may be some influence during the menstrual cycle which protects a patient from fits; that this influence operates during the luteal phase; and that its withdrawal leads to an irregular exacerbation at a variable time in relation to menstrual bleeding.

Since it is known that, in the non-pregnant woman, progesterone is produced only during the luteal phase and only during ovular cycles, the catamenial pattern and the accentuation of this pattern during phases of regular menstruation could be explained if it were assumed that progesterone exerted a slight but significant anticonvulsant action. The so-called menstrual exacerbation of fits would then be the result of the cessation of progesterone secretion and comparable with that known to occur when anticonvulsants are withdrawn.

Costa and Bonnycastle (1952), who investigated the ability of various steroids to protect dogs from agene-induced convulsions, found that progesterone not only had a considerable anticonvulsant action but also was the most effective of the steroids tested.

Deoxycortone (—C : O.CH2OH) differs from progesterone (—C : O.CH3) only in the introduction of a hydroxy group in its side-chain. Although deoxycortone acetate plays no important part in the treatment of epilepsy, there is no doubt that it may influence epileptic discharges. Woodbury et al. (1950) and Woodbury (1954) report a significant rise in the electric-shock threshold of rats treated with deoxycortone acetate and suggest a relationship to an observed rise in plasma-sodium level. McQuarrie et al. (1942), McQuarrie (1946), and Aird and Gordan (1951) have reported that epileptics have been improved by its exhibition.

This hypothesis does no more than postulate that an observed mid-luteal reduction in the incidence of fits might be due to some primary or secondary effect of the progesterone secreted during this phase. The interrelationships of the endocrines are so complex that it is hardly likely that the exhibition of progesterone would have a dramatic or sustained effect on the incidence of fits. Nevertheless, if an anticonvulsant action could be proved and its mechanism elucidated, it might prove a useful and physiological adjuvant in therapy.

Further investigations are to be undertaken. Should they, or others, demonstrate this hypothesis to be invalid, the facts which it attempted to explain will remain and stimulate others to offer and substantiate alternative hypotheses.

Summary

The relationship between seizures and menstruation was examined in 50 epileptic inpatients during 939 patient-years.

A method is explained for differentiating between phases of comparatively regular and those of grossly irregular menstruation, and the incidence of fits during the regular phases is estimated.

There is strong statistical evidence that there is a reduction of fits during the luteal phase, with an irregular increase immediately before, during, and after menstruation. The mid-luteal reduction but not the menstrual increase of fits was greater during regular menstruation.

Catamenial epilepsy may be due to an anticonvulsant action of progesterone, with an exacerbation of fits when its secretion stops.

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HYPOPITUITARISM AND GONADAL DYSGENESIS

THE RELATION OF THE PITUITARY GLAND TO SEXUAL DIFFERENTIATION

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It is now clear that women with gonadal dysgenesis ("ovarian agenesis") are most commonly genetically male (Moore et al. 1953, Polani et al. 1954, Carpentier et al. 1955, Grumbach et al. 1955)—assuming that nuclear pattern indicates chromosomal sex. This anomaly may be explained by the work of Jost (1953). He and his co-workers removed, or destroyed by X rays, the fœtal gonads at different stages of embryonic development in rabbits. In genetic female embryos their operations were followed by normal or near-normal feminine development; the genitalia became female in type. In male fœtuses, if the operations were performed before the genital tract had become differentiated, the fœtus developed along fully female lines, and the genitalia became totally feminine. If the operations were done a day or two later, forms of pseudohermaphroditism were produced, with partial feminisation, some development of the prostate, and hypospadias.

Thus it seems that differentiation along normal male lines depends on the presence of functioning testes. Without these, feminisation takes place, whether the fœtus was genetically destined to be male or female. Hence we may presume that, in the "male" cases of "ovarian agenesis," the primitive genital streak has not developed in utero into a testis, with the result that the embryo becomes totally feminised while retaining the male nuclear pattern. If the early development of the testes is halted slightly later, partial masculinisation of the genital tract may already have taken place, in which case a "male pseudohermaphrodite" results.

Importance of Pituitary in Sexual Differentiation

In addition to the above-mentioned experiments Jost (1953) reported the results of decapitation of embryos at various stages of development. This is the only known

practical way of performing hypophysectomy on growing embryos. The results obtained paralleled those which followed extirpation of the gonads. Once again, according to the stage of fœtal life at which the operation was done, male embryos could be made to develop either female or pseudohermaphroditic forms.

These experiments suggest that for normal male development to take place, pituitary as well as gonadal function must be intact. This may explain those few reported cases of gonadal dysgenesis in which the urinary excretion of gonadotrophin (F.S.H.) is not increased. Such cases have been described by Hertz et al. (1950), Dorff et al. (1947), Wilkins and Fleischmann (1944), Greenblatt and Carmona (1955), and Carpentier et al. (1955). In other words, we suggest, these patients showed intra-uterine hypogonadism manifesting as gonadal dysgenesis but secondary to hypopituitarism—just as, in postnatal life, hypogonadism may be primary (with high excretion of F.S.H.) or secondary (with low excretion of F.S.H.). Four adult patients in our own series have shown a similar low level of urinary gonadotrophin. In one of them laparotomy proved the existence of vestigial gonads; in three of them the skin cells showed a male nuclear pattern.

Fig. 1—Patient on admission: note female habitus, lack of pubic hair, and development of breasts.

We suggest that embryonic pituitary failure as regards gonadotrophin may occasionally give rise to the syndrome of gonadal dysgenesis. Furthermore, if this failure occurs late in embryonic life, male pseudohermaphroditism may result, as in the following case.

Case-report

A coloured male, aged about 70, was admitted to hospital in 1952 as a pseudohermaphrodite with hepatomegaly and piles. This diagnosis was correct, but the clinical picture was complicated by dwarfism, mental deficiency, epilepsy, severe anæmia, and considerable œdema of the legs and sacrum.

Examination.—He was weak, small, thin, wrinkled, and 4 ft. 6 in. tall, with a dry skin, a weak high-pitched voice, moderately developed breasts, broad hips, and the general configuration of a woman (fig. 1). His thyroid cartilage was small, and there was no temporal recession of hair. There was a tiny penis rather far forward and well-separated from a diminutive pigmented wrinkled excrescence which would pass for an ill-formed scrotum (fig. 2) There was nothing resembling a vagina, and no testis was felt. Axillary and pubic hair were absent.

Fig. 2—External genitalia of patient: note ill-formed scrotum well separated from small penis.

Laboratory Investigations.—Examination of the blood showed hæmoglobin 4 g. per 100 ml., with hypochromia and macrocytosis. The bone-marrow was hyperplastic, not megaloblastic. The serum-cholesterol level was 224 mg. and 205 mg. per 100 ml. The Wassermann reaction was negative. The serum-albumin level was 3·8 g. per 100 ml., and serum-globulin 1·8 g. (Tests requiring coöperation—e.g., basal metabolic rate and water load—were impracticable.)

Radiography showed flattened vertebral bodies, probable osteoporosis, feminine appearance of bones—non-fusion of the bones of the calvarium and of the epiphyses of the iliac crests, and a curiously increased density of the tips of the lumbar transverse processes and of parts of the iliac crests (as seen sometimes in cretinism). Cretinism was suspected, and insulin-tolerance was tested at full dosage (0·1 unit per kg. body-weight). Unfortunately the patient displayed hypoglycæmic unresponsiveness. The figures were:

Fasting blood-sugar	90 mg. per 100 ml. (Hagedorn-Jansen method; capillary blood)
10 min. after insulin	85 mg. per 100 ml.
20 " " "	72 " "
30 " " "	63 " "
40 " " "	58 " "
60 " " "	53 " "
90 " " "	40 " "

At this stage the patient passed into coma and proved strangely resistant to intravenous glucose. Despite restoration of the blood-sugar level he remained semicomatose, with an extremely low rectal temperature. He did not respond to warming.

Necropsy Findings.—The testes were extremely small and incompletely descended. Histologically there were numerous atypical interstitial cells, atrophic seminiferous tubules, and no evidence of normal spermatogenesis (Dr. C. J. Uys). The epiphyses of the long bones were not obliterated, and the costal cartilages were not calcified. The thyroid was atrophic (12 g.), but the suprarenals were apparently normal (11 g.). The pituitary was very small (3 mm. in diameter) and had a smooth capsule. The nuclear pattern (established by examination of sections of numerous organs) was male.

Comment

This patient had congenital hypopituitarism. This explains the dwarfism, the small size of the testes and thyroid gland with hypogonadism and hypothyroidism, the hypoglycæmic and hypothermic comas, the radiological skeletal abnormalities, and perhaps the anæmia. Confirmation was afforded by finding a tiny unwrinkled pituitary gland at necropsy. In addition mild pseudohermaphroditism is suggested by the separation of the penis from the ill-formed scrotum and by the lack of descent of the testes.

We suggest that the hypopituitarism was present during intra-uterine development. This led to secondary partial gonadal failure, which became manifest as a mild form of male pseudohermaphroditism (supported by finding a male nuclear pattern).

The development of the breasts cannot easily be explained, but may be related to the presence of a diseased liver. The normal size of the suprarenals was compatible with some activity. In this case the hypopituitarism seems to have chiefly affected the production of gonadotrophin and thyrotrophin. This combination is found not infrequently in acquired hypopituitarism. In the case reported by Dorff et al. (1947), with gonadal dysgenesis and low urinary F.S.H., there was apparent failure of the same two trophic hormones.

Summary

Jost (1953) has suggested that the pituitary, as well as the testes, is essential for the normal differentiation of the genital tract in the male embryo.

We postulate that intra-uterine failure of the pituitary gland to produce gonadotrophin, with secondary gonadal failure, could explain cases of gonadal dysgenesis or male pseudohermaphroditism with low urinary F.S.H.

A case of congenital hypopituitarism with mild male pseudohermaphroditism is presented as further evidence in favour of this hypothesis.

Addendum

The above-considered hypothesis would have been supported if deprivation of the pituitary gland at an early stage led to total lack of differentiation of the gonad. Professor Jost, however, tells us that, in rabbits, the gonadotrophic activity of the pituitary seems to become conspicuous at a relatively later stage, so that some gonadal development may occur even in anhypophyseal monsters.

We wish to thank Dr. C. Merskey for permission to report on the patient, who was under his care; Prof. J. F. Brock, Prof. F. Forman, and Prof. G. C. Linder for their interest and help; and Dr. C. Macpherson and Dr. C. J. Uys for the pathological reports.

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HEREDITARY HYPERCHOLESTEROLÆMIC XANTHOMATOSIS

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THE increasing incidence of ischæmic heart-disease has focused attention on the factors producing atheroma. Among these the rôle of cholesterol has been extensively studied. Hypercholesterolæmia is sometimes found in ischæmic heart-disease, especially in patients aged less than 50 (Boas et al. 1948, Morrison et al. 1948); it may also occur in association with coronary atheroma in diabetes mellitus and in myxœdema. But the relationship between a raised serum-cholesterol level and atheroma is most clearly seen in hereditary hypercholesterolæmic xanthomatosis.

The xanthomatoses are a miscellaneous group of diseases which have in common the formation of yellow "tumours" characterised histologically by large pale cells with foamy cytoplasm containing cholesterol. Until recently the classification and differentiation of the various types of xanthomata have been confused (Thannhauser 1950). The characteristic features of hereditary hypercholesterolæmic xanthomatosis are revealed by the title: namely, the hereditary nature of the condition, and the constantly raised serum-cholesterol level. The free cholesterol and the cholesterol esters are equally affected. The phospholipids are also increased. The neutral fat is normal or only slightly increased, and so the serum does not appear milky.

Clinically, the disease involves the skin, tendons, and cardiovascular system. The skin lesions include xanthelasma and xanthoma tuberosum. Xanthelasma appears around the eyes and on the eyelids in young adult life and slowly increases in size; it often occurs as an isolated condition apart from xanthomatosis. The lesions of xanthoma tuberosum are nodular yellow-orange elevations on the skin, commonly situated on the *extensor* surfaces of the arms, elbows, and knees, and on the buttocks. The tendon lesions are firm subcutaneous nodes attached to the extensor tendons of the fingers at the level of the metacarpophalangeal joints, to the Achilles tendons, and less commonly to other tendons of the upper and lower limbs. They cause no disability unless they interfere with the function of a neighbouring joint. Xanthomata may also form in close relation to bone, particularly around the upper ends of the tibiæ. In the cardiovascular system atheroma develops at an earlier age and to a more severe degree in this disease than in the general population. Angina pectoris, cardiac infarction, and intermittent claudication all commonly occur. Xanthomata have on rare occasions been described on the valves of the heart (Fox 1879, Lehzen and Knauss 1889, Hess 1934). Arcus senilis has also been reported in young adults with this disease.

Material and Methods

Eleven families with hypercholesterolæmia and xanthomatosis are described here. Ten of the families were first seen because one of their number developed ischæmic heart-disease. They were seen in a period of two years at the National Heart Hospital, Westminster Hospital, and the London Hospital. 67 patients were examined personally, and in each the serum-cholesterol level was estimated by the method of Sackett (1925). In a few patients the serum-lipids were fully analysed. The phospholipids were determined as lecithin—i.e., 25 times the phosphorus content—by the method of Berenblum and Chain (1938). The total fatty acids were estimated by a slightly modified method of Stoddard and Drury (1929), and the neutral fat was then calculated from these results. The range of normal values given by these estimations is as follows: total serum-cholesterol 150–300 mg. per 100 ml.; serum-neutral fat 0–200 mg. per 100 ml.; serum-phospholipids 150–250 mg. per 100 ml.; and total serum-lipids 400–700 mg. per 100 ml.

Clinical and Biochemical Features

In the eleven families 29 patients with hypercholesterolæmia were found; the clinical details are described in tables I and II. In addition, 1 patient (case L35) had xanthoma tendinosum, but his serum-cholesterol level was not estimated. In families A, D, F, H, and J, 1 further close relation had died of cardiac infarction but had not been investigated. Thus 35 patients showed evidence of hereditary xanthomatosis. The sex-distribution was nearly equal (19 males, 16 females). It is clear from table I that hypercholesterolæmia alone is the rule under the age of 30. Clinical evidence of xanthomatosis becomes increasingly common from the fourth decade onwards. The mean age of the 10 patients with hypercholesterolæmia alone was 31 (range 9–56 years); the mean age of the 19 patients with clinical evidence of xanthomatosis was 46 (range 30–70). These findings are similar to those of Piper and Orrild (1956). Patients with hypercholesterolæmia alone have, in the past, been labelled *formes frustes* of the disease. This is a misleading term because it implies that, in these patients, the disease is present in a mild form only, whereas Piper and Orrild (1956) estimate that at least 80% of them are destined to develop frank xanthomatosis later.

Table III shows the estimations of the serum-cholesterol levels. Of the 67 patients investigated 26 had a total serum-cholesterol level above 350 mg. per 100 ml.; 16 of these had clinical evidence of xanthomatosis, and 10 had hypercholesterolæmia alone; all were regarded as having hereditary xanthomatosis. In 10 other patients the total serum-cholesterol level was 300–350 mg. per 100 ml.; 3 of this borderline group had clinical evidence of xanthomatosis; in the remaining 7 no lesions were present, and these patients were therefore regarded as normal. It is, however, possible that some of them may develop the disease later. In 31 patients the serum-cholesterol level was within the normal range.

Table IV shows the results of the analysis of the serum-lipids in 6 patients.

Case A1, a man aged 70, had no symptoms when he was first seen in January, 1955. On examination he had large

TABLE I—CLINICAL DETAILS

Case no.	Sex	Age (yr.)	Relationship to initial member of family	Total serum-cholesterol (mg. per 100 ml.)	Xanthoma tuberosum	Xanthoma tendinosum	Xanthelasma	Duration of ischæmic heart-disease (yr.)	Intermittent claudication	Other features	Follow-up
Family A:											
1	M	70	..	600	–	+	–	..	–	Aortic aneurysm	Dead
2	M	56	Brother	634	–	–	–	..	–	..	Alive
3	M	43	Son	623	+	+	–	4	–	Renal calculus	Alive
4	F	38	Daughter	543	–	+	–	..	–	..	Alive
5	M	35	Son	518	–	+	–	..	–	Renal calculus	Alive
6	F	26	Niece	607	–	–	–	..	–	..	Alive
7	F	12	Grand-daughter	464	–	–	–	..	–	..	Alive
8	F	11	Grand-daughter	492	–	–	–	..	–	..	Alive
9	M	53	Brother	..	–	–	–	Present	–	..	Dead
Family B:											
10	F	56	..	375	–	–	–	2	–	..	Alive
11	M	50	Brother	600	–	+	–	9	–	Mitral stenosis	Alive
12	M	39	Brother	435	–	–	–	..	–	..	Alive
13	F	34	Sister	388	–	–	–	..	–	..	Alive
14	M	35	Son	375	–	–	–	..	–	..	Alive
Family C:											
15	F	70	..	324	–	+	–	2	–	..	Dead
16	F	48	Daughter	399	–	–	–	..	–	..	Alive
17	M	46	Son	405	–	+	–	..	–	..	Alive
Family D:											
18	F	47	..	460	–	–	+	11	–	..	Alive
19	F	45	Sister	332	–	–	+	1	–	..	Dead
20	F	43	Sister	400	–	–	–	3	+	..	Dead
21	M	51	Brother	..	–	–	–	Present	–	..	Dead
Family E:											
22	F	47	..	395	–	–	–	..	–	..	Alive
23	M	41	Brother	446	–	+	–	8	–	..	Alive
24	M	9	Nephew	400	–	–	–	..	–	..	Alive
Family F:											
25	F	52	..	502	–	+	–	..	–	..	Alive
26	M	39	Brother	685	+	+	–	1	+	Arcus senilis	Alive
27	M	38	Brother	..	–	–	–	Present	–	..	Dead
Family G:											
28	F	53	..	390	–	+	+	6	–	..	Alive
Family H:											
29	M	38	..	445	+	+	–	..	–	..	Alive
30	F	69	Mother	..	–	+	+	Present	–	..	Dead
Family J:											
31	M	57	..	300	–	+	–	6	–	..	Alive
32	F	65	Mother	..	–	–	–	Present	–	..	Dead
Family K:											
33	M	48	..	449	+	–	–	5	–	..	Alive
Family L:											
34	M	30	..	447	–	+	–	3	–	Arcus senilis	Alive
35	M	34	Brother	..	–	+	–	..	–	..	Alive

xanthomata attached to the extensor tendons of the right and left middle fingers at the level of the metacarpophalangeal joints. In his abdomen was a large firm pulsatile tumour situated slightly to the left of the midline at the level of the umbilicus; it was about as large as a grapefruit. Plain radiography showed curvilinear calcification on the left side of the abdomen, "consistent with an aneurysm of the abdominal aorta." The blood Wassermann and Kahn reactions were negative. On April 9, 1956, the patient was suddenly seized with severe bilateral low-abdominal pain radiating into his groins. After some hours he became unconscious, and he died twenty-four hours after the onset of symptoms.

Necropsy findings (Dr. A. D. Morgan).—The small intestine and transverse colon were pushed forwards by a massive retroperitoneal hæmorrhage originating in a tear of the anterior wall of a large arteriosclerotic aneurysm of the abdominal aorta. The aneurysm was partly lined by mural thrombus and had originated immediately below the level of the renal arteries. The thoracic and abdominal aorta, the great vessels of the neck, and the subclavian, iliac, femoral, popliteal, and tibial arteries all showed gross atherosclerosis with abundant fatty change, ulceration, and calcification. The coronary arteries showed slight atheroma and no evidence of occlusion. The pulmonary arteries showed a few atherosclerotic patches. The splenic, hepatic, superior mesenteric, and renal arteries showed little evidence of disease. Histologically the extensor tendons of the fingers showed all phases of cholesterol deposition, from the intracellular, characterised by macrophages developing into foam cells, to the extracellular crystalline deposits between the disrupted fibres of the tendons. The aorta showed gross intimal thickening, in which amorphous granular protein or acellular laminæ were more conspicuous than lipid deposits or calcification, although these were present in the abdominal portion, accompanied by gross medial atrophy.

TABLE II—LESIONS PRESENT IN 29 PATIENTS WITH HYPERCHOLESTEROLÆMIA

Lesion	No. of cases
Xanthoma tendinosum	14
Ischæmic heart-disease	13
Xanthoma tuberosum	4
Xanthelasma	3
Intermittent claudication	2
Aortic aneurysm	1
Hypercholesterolæmia alone	10

Inheritance

The pedigrees of families A and B are shown in figs. 1 and 2 respectively. Although it is impossible to draw firm genetical conclusions from the present series, all the pedigrees are compatible with the view that the condition is transmitted as a mendelian dominant. None of the normal patients had abnormal offspring. Fliegelman et al. (1948) have postulated that the disease is trans-

TABLE III—SERUM-CHOLESTEROL ESTIMATIONS

Family	No. investigated	Total serum-cholesterol (mg. per 100 ml.)		
		150–299	300–350	350+
A	11	2	1	8
B	18	12	1	5
C	6	3	1	2
D	7	4	1	2
E	10	5	2	3
F	6	2	2	2
G	1	..	..	1
H	5	3	1	1
J	1	..	1	..
K	1	..	..	1
L	1	..	..	1
Total	67	31	10	26
No. with clinical evidence of xanthomatosis	19	..	3	16

mitted as an incomplete dominant trait, with the clinical lesions of xanthomatosis occurring in homozygotes, and hypercholesterolæmia alone in heterozygotes. If this were so, all the offspring of patients with evident xanthomatosis should have a raised serum-cholesterol level. This was not so in the present series for 12 children with a normal serum-cholesterol level had been born to patients with clinical evidence of xanthomatosis. Other workers (Alvord 1949, Stecher and Hersh 1949, Wheeler and Sprague 1953, Piper and Orrild 1956) have concluded that the condition was transmitted as a simple mendelian dominant, and the present series accords with that view.

Differential Diagnosis

Hereditary hypercholesterolæmic xanthomatosis requires to be distinguished from other forms of xanthomatosis :

Xanthomatosis associated with a normal serum-cholesterol level. This is a diverse group of conditions, including the Hand-Schüller-Christian syndrome, eosinophilic granuloma of bone, Letterer-Siwe disease, and disseminated xanthomatous lesions in the liver, spleen, lymph-nodes, brain, lungs, and skin. The skin lesions are usually situated on the *flexural* surfaces. The serum-cholesterol level is normal, and these conditions are not hereditary. The cardiovascular system is not affected.

Xanthomatosis associated with a raised serum-cholesterol level, and a much-raised serum-neutral-fat level. This occurs in a few cases of diabetes mellitus, chronic pancreatitis, glycogen storage (von Gierke's) disease, and nephrosis ; it also occurs rarely as a primary disease known as idiopathic hyperlipæmia. In all these conditions, the great increase in the neutral fat imparts a milky appearance to the serum. Idiopathic hyperlipæmia in particular may mimic hereditary xanthomatosis (Lever et al. 1954) ; the skin and tendon lesions and ischæmic heart-disease are common to both diseases, and some cases of idiopathic hyperlipæmia are hereditary. Xanthelasma is said not to occur in idiopathic hyperlipæmia. Recurrent attacks of pancreatitis, together with enlargement of the liver and spleen, are common in idiopathic hyperlipæmia.

TABLE IV—ANALYSIS OF SERUM-LIPIDS (MG. PER 100 ML.)

Case no.	Total cholesterol	Phospho-lipids	Neutral fat	Total lipids
A1	600	335	183	1118
A3	623	408	190	1221
A4	543	390	262	1195
A7	464	395	232	1091
B11	600	258	344	1202
C15	324	221	314	859

The diagnosis of hypercholesterolæmic xanthomatosis is not difficult if the condition is borne in mind, especially in the examination of relatively young patients with ischæmic heart-disease. Both the skin and tendon lesions are easily recognised ; the diagnosis can be quickly confirmed by finding a raised serum-cholesterol level in clear serum.

Prognosis

The prognosis depends entirely on the liability to develop atheroma, the other manifestations of the disease being harmless. Some patients live a normal span, even in the presence of severe atheroma ; thus 2 patients in the present series died at the ages of 71 and 70 from ruptured aneurysm and cardiac infarction. Most patients, however, develop ischæmic heart-disease at a much younger age. The mean age at the onset of angina pectoris in the 13 patients in the present series was 43.

Treatment

The object of treatment is to reduce the serum-cholesterol to normal ; skin xanthomata may then regress, but tendon lesions are rarely, if ever, affected. If the serum-cholesterol is maintained at a normal level, the liability to develop ischæmic heart-disease may be minimised. The current methods of treatment are of doubtful value and require continuation for life, often at great inconvenience to the patient. Three methods of treatment require brief discussion :

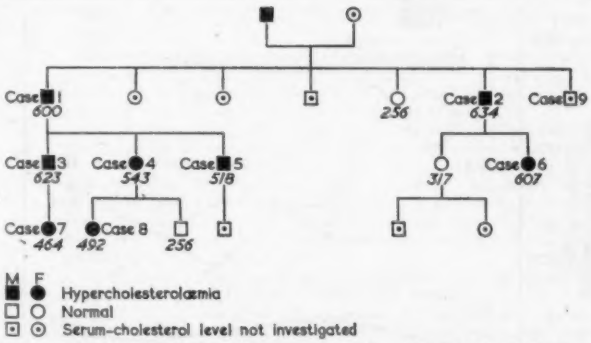

Fig. 1—Pedigree of family A : italic numerals, serum-cholesterol level (mg. per 100 ml.).

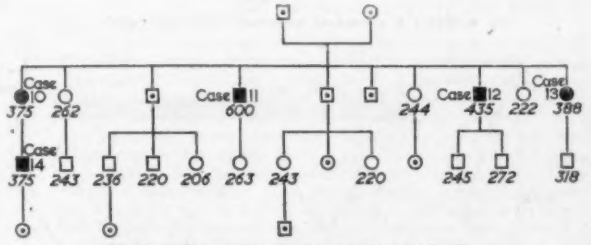

Fig. 2—Pedigree of family B (symbols as in fig. 1).

Diet

Restriction of the intake of fat has been recommended for some years, and conflicting reports of its value have been published. Urbach et al. (1952) reviewed previous work and concluded that, to be effective, the total intake of animal and vegetable fat must be less than 25 g. daily. They reported 9 patients treated with a diet containing 20 g. of fat and 100 mg. of cholesterol daily. All the patients showed a significant fall in the serum-cholesterol, but in some of them the serum-cholesterol level rose again in spite of continuing the diet. Skin lesions regressed totally or partially.

Only 1 patient in the present series was treated with a low-fat diet. This man (case A3) consumed a diet containing 15 g. of animal fat and 100–300 mg. of cholesterol daily. Fig. 3 shows that, after an initial fall, the serum-cholesterol rose to high levels in spite of continuing the diet. His angina of effort disappeared four months after beginning the diet.

Dietary restriction of fat cannot impair the endogenous production of cholesterol, estimated by Gould (1951) as 1·5–2·0 g. daily. It is therefore not surprising that little effect on the serum-cholesterol level can be maintained. Recently attention has been drawn towards the possibility of lowering the serum-cholesterol level by the consumption of oils with a high content of unsaturated

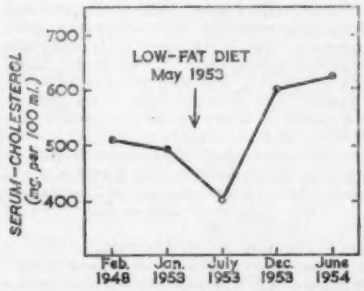

Fig. 3—Effect of low-fat diet on serum-cholesterol level.

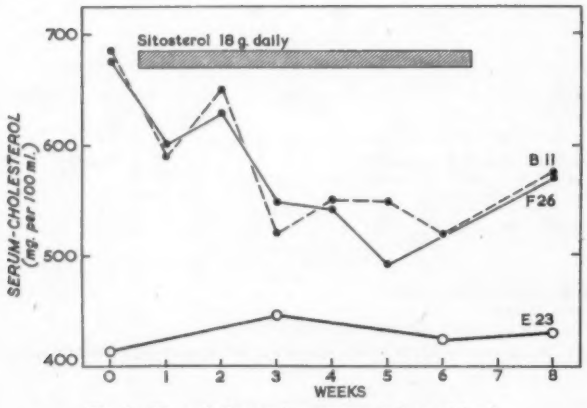

Fig. 4—Effect of sitosterol on serum-cholesterol level.

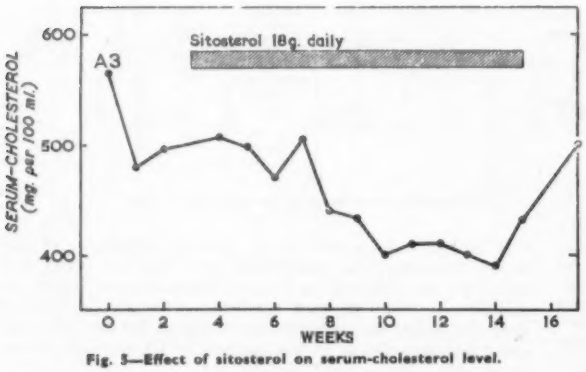

Fig. 5—Effect of sitosterol on serum-cholesterol level.

fatty acids (Bronte-Stewart et al. 1956). Malmros and Wigand (1955) treated 8 cases of hereditary xanthomatosis with a diet rich in corn-oil; this led to a considerable fall in the serum-cholesterol level.

Sitosterol

Peterson (1951) observed that the simultaneous administration of soybean sterols and cholesterol to the diet of chicks did not produce the hypercholesterolæmia which was obtainable by feeding with cholesterol alone. Mixed soybean sterols contain principally stigmasterol and sitosterol. Sitosterol is the stereo-isomer of cholesterol and is one of the non-absorbable plant-sterols; it forms mixed crystals with cholesterol. Peterson suggested that sitosterol might interfere with the absorption of the dietary cholesterol and of the cholesterol excreted in the bile, much of which is reabsorbed lower in the alimentary tract. It was therefore hoped that sitosterol might also remove some of the endogenous cholesterol. Peterson emphasised that considerable excess of sitosterol over cholesterol was required.

Pollak (1953) fed rabbits with sitosterol and cholesterol and confirmed that hypercholesterolæmia and atheroma were prevented. He then gave 7–10 g. of sitosterol daily to people on normal diets containing about 0·6 g. of cholesterol daily. The serum-cholesterol levels fell, reaching the lowest value within one or two weeks. The greatest falls in the serum-cholesterol level took place in those patients in whom the serum-cholesterol level was initially raised.

Barber and Grant (1955) gave 9 g. of β-sitosterol daily to 26 patients with ischæmic heart-disease, and found a small fall in the mean serum-cholesterol level which was "suggestive but not significant." They suggested that a daily dose of 18 g. of sitosterol would be more effective.

Sitosterol was given in the form of biscuits, each containing 1·5 g., to 4 patients in the present series. The biscuits were bulky but not too unpalatable. The patients were allowed a normal diet and took 18 g. of sitosterol daily; 3 of the patients were treated for six weeks, and 1 was treated for twelve weeks. The results are shown in figs. 4 and 5, which show that, in 3 or 4 patients, a fall of the serum-cholesterol level of up to 20% was obtained, but in no patient did the serum-cholesterol reach a normal level. A shortage of supplies made it impossible to continue the treatment longer. It appears that, although a fall of the serum-cholesterol level can be obtained with sitosterol, it is relatively small and of doubtful value.

Heparin

Patients with hereditary xanthomatosis have been found to have increased amounts of the S_f (Svedberg flotation) 10–20 and 20–40 classes of lipoproteins (McGinley et al. 1952). The intravenous injection of heparin into patients with this disease transforms the β-lipoproteins from higher to lower S_f rates (Herbst et al. 1955). Gofman (1952) treated 5 patients with intramuscular heparin 100 mg. daily; the S_f 12–20 lipoproteins were considerably reduced, and definite shrinking of xanthomata was noted about a month after the start of treatment. Calvert (1953) treated 1 patient with heparin 25 mg. twice weekly and noted a fall in the serum-cholesterol level and regression of skin xanthomata.

Heparin thus offers a possible method of lowering the serum-cholesterol level. It may be injected subcutaneously by the patient; given with a small amount of 1% procaine the injections are not very painful. Nevertheless, the treatment is expensive and not without risk, and its use should probably be confined at present to those patients who have developed ischæmic heart-disease.

Summary

Eleven families with hereditary hypercholesterolæmic xanthomatosis are presented. The clinical features included xanthelasma, xanthoma tuberosum, xanthoma tendinosum, ischæmic heart-disease, and intermittent claudication. One patient had an atherosclerotic aneurysm of the abdominal aorta.

The total serum-cholesterol and phospholipids are increased, but the amount of neutral fat in the serum is normal or only slightly increased.

The condition is hereditary and is probably transmitted as a mendelian dominant.

Treatment with a low-fat diet, sitosterol, and heparin is briefly discussed.

The disease is not rare and should be considered especially as a cause of ischæmic heart-disease in early and middle adult life.

I wish to thank Dr. Maurice Campbell, Dr. D. Evan Bedford, Dr. Paul Wood, Dr. William Evans, Dr. F. Dudley Hart, and Dr. Richard Bayliss for permission to study patients under their care and for their helpful criticism of this paper; Dr. Eunice Lockey and Dr. Joan Zilva for the numerous serum-cholesterol estimations; Dr. A. D. Morgan for the necropsy report; Dr. J. D. Billimoria for the analyses of serum-lipids; Dr. R. Dixon Firth, of the Energen Dietary Service, for the supplies of sitosterol; and Miss Joan Baker for much assistance in the examination of patients and the collection of samples.

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GALLAMINE TRIETHIODIDE AND RENAL DISEASE

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GALLAMINE triethiodide ('Flaxedil') was introduced into anæsthetic practice in 1949 (Mushin et al. 1949). Since then its use has become established, and it is now one of the most popular of the muscle relaxants. We therefore draw attention to a potential danger in its use which may not be sufficiently appreciated.

Pharmacology

Gallamine triethiodide(1:2:3-tri-(2-diethylaminoethoxy)-benzene triethiodide) was first described by Bovet et al. (1947). Its effects in man were studied by Mushin et al. (1949). Like *d*-tubocurarine chloride, gallamine blocks the transmission of nerve impulses across the myoneural junction, an effect readily reversed by neostigmine, edrophonium and physostigmine (eserine).

Gallamine differs from *d*-tubocurarine chloride in several respects, but only two are relevant to the present discussion—namely, duration of action and excretion. A dose of about 1 mg. per kg. of body-weight causes complete paralysis of the flexor muscles of the forearm and the muscles of the abdominal wall in a healthy person and diminishes the respiratory tidal volume. This effect lasts about 20–25 minutes in contrast to 30–45 minutes with an equipotent dosage of *d*-tubocurarine chloride.

The exact fate of gallamine in the body is uncertain, but Mushin et al. (1949) recovered 30–100% in the urine of rabbits and cats within two hours of its administration. The *British Pharmaceutical Codex Supplement (1952)* states: "The drug is not broken down in the body but is largely excreted in the urine." The metabolism of *d*-tubocurarine chloride is even more obscure: only 30–40% is recoverable in the urine, and the remainder is assumed to be broken down in the body.

Case-report

A married woman, aged 38, was admitted to hospital on July 11, 1956, for treatment of severe menorrhagia. She had been known to have chronic nephritis since December, 1951; the condition having been diagnosed during her one and only pregnancy. From January, 1955, she had steadily increasing uræmia associated with an equally progressive diastolic hypertension. Her serum-potassium and serum-sodium levels, estimated on several occasions in the months preceding operation, were within normal limits. She remained sufficiently well to do light household duties until her admission to hospital became urgent owing to heavy vaginal bleeding, with symptoms of severe anæmia—weakness, fainting attacks, &c.

On admission her blood-pressure was 135/90 mm. Hg (although for many months previously an average recording had been 180/125 mm. Hg); hæmoglobin 32%; and blood-urea level 200 mg. per 100 ml.

Treatment and Progress.—She was slowly transfused with 2 pints of blood on July 12. She improved, and her blood-loss decreased. A further transfusion of 2 pints of blood was given on July 17. On July 19 examination of her blood showed hæmoglobin 54%, red cells 2,270,000 per c.mm., colour-index 1·2, and leucocytes 7400 per c.mm.

Hysterectomy (July 20).—After premedication with atropine gr. $^1/_{100}$ and morphine gr. $^1/_4$ at 10.30 A.M., the induction of anæsthesia was begun at 11.30 A.M. Anæsthesia was induced with cyclopropane and oxygen. Gallamine triethiodide 80 mg. was given intravenously and a no. 9 cuffed endotracheal tube passed. Pethidine 30 mg. was given intravenously, and anæsthesia was maintained with nitrous oxide and oxygen in a closed circuit.

12.10 p.m.: A further 80 mg. of gallamine was administered because of tightness of the abdominal muscles.

12.30 p.m.: atropine gr. $^1/_{50}$ was given, followed after 5 minutes by neostigmine 7·5 mg. Tidal exchange was satisfactory at the end of the operation.

Postoperative Course.—At 3.0 P.M. the patient spoke to the ward sister but appeared confused.

7.0 p.m.: The patient was having difficulty with breathing and speaking.

9.45 p.m.: Very shallow breathing, pallor, profuse perspiration, drooping eyelids, and a half-open mouth dribbling saliva, in a motionless patient, at first obscured the fact that she was fully conscious. She could not open her eyes, articulate, cough, or swallow, and abortive attempts to do so only increased her great distress. Continuing curarisation was diagnosed, and atropine gr. $^1/_{50}$ followed 5 minutes later by neostigmine 2·5 mg. were administered intravenously. The response was dramatic. The patient opened her eyes, coughed up about 90 ml. of saliva and mucus, and started to move her limbs. Her speech was restored, and the tidal exchange increased considerably. A further 2·5 mg. of neostigmine was then administered. Next morning, at 1.20 A.M., her blood-pressure was 134/96 mm. Hg, pulse of normal volume, pulse-rate 70. Profuse perspiration and pallor had lessened Normal muscular power was maintained. Next morning (July 22) the patient relapsed into a state of partial curarisation, with ptosis, dropped lower jaw, weak limbs, hypotonic facial musculature, slurred speech, and "transverse smile." She complained of difficulty in focusing her eyes and of double vision. Her blood-pressure was 180/110 mm. Hg and pulse-rate 90. At 12.55 P.M. atropine gr. $^1/_{50}$ followed by neostigmine 5 mg. intravenously were administered and produced the same dramatic improvement as on the previous evening. After this no further neostigmine was necessary, though the patient had some diplopia for a further two days. On July 21 her blood-urea was 198 mg. per 100 ml. She was discharged from hospital on Aug. 4, having been ambulant for some days and feeling fairly well, though easily fatigued.

Discussion

This patient showed prolonged curarisation lasting 24 hours after the administration of gallamine triethiodide. Fairley (1950) described a chronic nephritic, aged 33, with a blood-urea of 60 mg. per 100 ml., who was subjected to hysterotomy and sterilisation and received thiopentone 400 mg., gallamine 100 mg., nitrous oxide and oxygen, and cyclopropane. No neostigmine was given at the end of the operation, but 13 hours later there was still some respiratory weakness, which was reversed without further incident by neostigmine 1·25 mg. and atropine gr. $^1/_{100}$. Nowadays such treatment would be open to criticism; if there was still respiratory weakness at the end of 13 hours, the tidal volume was presumably at least as poor at the end of the operation.

Joske et al. (1954) describe three cases of recurarisation. Two of the patients were given neostigmine at the end of the operation: one had 3·5 mg.; in the other the dose is not recorded. Both patients showed recurarisation within an hour. The third patient had no neostigmine, because respiration was deemed adequate at the end of the operation; the patient complained of difficulty in breathing and muscular weakness 2 hours after the operation.

In all three cases a dose of gallamine in excess of 240 mg. had been administered. Only 2 patients had evidence of renal disease, and this was not gross. The

DR. LEONARD: REFERENCES—*continued*

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return of curarisation in the two cases receiving neostigmine was within only 1 hour; this is difficult to explain unless an inadequate dose of neostigmine had been administered.

Normally 5 mg. of neostigmine administered at the close of operation is adequate to prevent recurarisation. The excretion of a single dose of gallamine in a healthy person takes about 2 hours (Doughty and Wylie 1951). Very little work appears to have been done on the fate of gallamine in man. The present case suggests that, as in animals, gallamine is probably excreted unchanged by the kidneys. The administration of supplementary doses during anæsthesia within 2 hours of an initial dose must be cumulative, despite the fact that clinically the effects of the initial dose may have disappeared. It is now, however, well recognised that when antidepolarising relaxants have been administered at all during anæsthesia, neostigmine should be administered at the close of the operation. What is perhaps less well recognised is that renal disease may so delay excretion of the relaxant that repeated injections of neostigmine may be required over a period of 24 hours or possibly even longer, postoperatively.

It is re-emphasised that gallamine in patients in whom there is a possibility of renal disease—e.g., prostatectomies—especially in emergencies at night, should be used, if at all, with caution. Patients with defective renal function may die postoperatively from hypoxia following the use of muscle relaxants, especially in a darkened ward at night, where the condition may escape detection.

Summary

Prolonged postoperative curarisation followed the use of gallamine triethiodide in a patient with severe renal disease is described.

Previously published similar cases are analysed.

We wish to thank Mr. W. N. Chisholm and Dr. J. H. Wakely for permission to publish clinical details.

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A BARBER'S INTERDIGITAL PILONIDAL SINUS

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SURGEON, GENERAL INFIRMARY, LEEDS

SINUSES which are chronically infected occur between the fingers of men who cut other men's hair. Women's hairdressers do not seem to be troubled in the same way.

The sharp stiff bristly short hairs penetrate the skin and cause, like other foreign bodies, a chronic granuloma or sinus which discharges intermittently and will not heal until the foreign body has been removed or the track containing the foreign body has been excised. Short hair stumps may also penetrate the skin of the fingers alongside the nails and cause a sinus or chronic paronychia.

An interdigital sinus behaves like a fistula-in-ano or a pilonidal sinus elsewhere, for instance, in the sacrococcygeal region, the axilla (Aird 1952), the umbilical region (Patey and Williams 1956), the suprapubic region (MacLeod 1953), an amputation stump (Shoesmith 1953), the back of the neck (Patey 1952), or the perineum (Smith 1948). These pilonidal sinuses appear to be acquired and may be caused by loose hairs, foreign bodies, or inspissated secretions being drawn into small abrasions or acne pits in the skin. Some think that they may be caused by growing hairs curling round in their growth and penetrating the adjacent skin (Patey 1952). Some still believe that, in the sacrococcygeal region, sinuses arise primarily from congenital neurenteric fistulæ or sinuses. Sometimes a congenital postanal dimple may become chronically infected by the accumulation of secretions and hairs; an abscess forms which points on to the surface between the nates at numerous sites. Occasionally, as Haworth and Zachary (1955) have described, a congenital sinus lined by surface ectoderm communicates with the ectoderm of the spinal canal. Meningitis may follow infection of this type of fistula, but in my experience a cyst in front of the sacrum is more likely to communicate with the spinal canal than is one behind it.

Case-report

A man's hairdresser, aged 40 and right-handed, complained that, intermittently during the last two or three years, the cleft between his left index and middle fingers had become painful, swollen, and red. His wife had noticed a small "bunch of hairs sticking into the flesh" in this situation about three years ago. She pulled the hairs out with tweezers. A hollow remained here, and loose hairs had often accumulated in it since.

On examination the patient's general condition was excellent. There was a small depression and sinus opening into the web between the left index and middle fingers (fig. 1). The skin around was red and mildly inflamed. The opening appeared black, and, when a lens was used, small dark hair stumps could be seen protruding from the opening of the sinus (fig. 2). On the radial side of the nail of the left ring finger there was an area of redness which resembled a chronic paronychia, but no loose hairs could be seen here, either under the nail or alongside it.

Operation.—On May 15, 1956, under general anæsthesia, the interdigital sinus was excised and the wound closed with fine stitches. The patient went home on May 18, and has been working since.

Pathology.—Dr. W. Goldie examined the tissue which had been removed: "*Naked eye.* A tiny ellipse of skin 1·2 cm. by 0·5 cm. with subcutaneous tissue to a depth of 0·5 cm. Opening on to the skin surface is a small sinus which can be seen tracking into the subcutaneous tissue. A piece of hair is seen near this sinus track. A second tiny piece of subcutaneous tissue is also received. *Histology.* The sinus is lined by squamous epithelium, and the surrounding tissues are inflamed; the exudate consists of plasma cells and lymphocytes. In the second piece of tissue many hairs are seen on cross-section. They occupy spaces in the tissue and are surrounded by a zone of inflamed fibrous tissue, the exudate consisting of pus cells, lymphocytes, and plasma cells; a few foreign-body giant cells are also seen. This is a pilonidal sinus caused by the introduction of hairs underneath the skin."

Discussion

A comprehensive review of barber's interdigital sinus was made by Currie et al. (1953), who described 11 cases and referred to 14 others reported previously. They

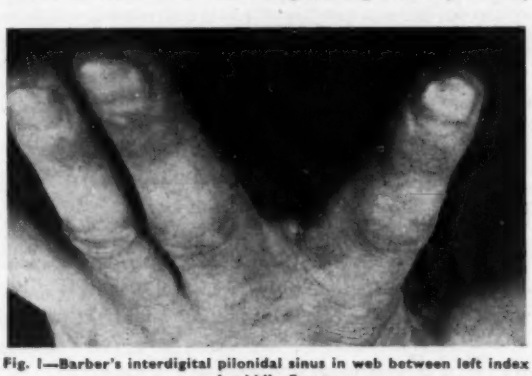

Fig. 1—Barber's interdigital pilonidal sinus in web between left index and middle fingers.

examined 77 male hairdressers and found 10 with interdigital sinuses. There were no interdigital sinuses in the 61 female hairdressers they examined. Joseph and Gifford (1954), by arrangement with the Barbers' and Beauticians' Union of San Francisco, examined 115 barbers and found that 15 had interdigital sinuses. These figures suggest a prevalence of about 13% among male barbers. Often the symptoms were trivial and had not been reported to a doctor.

Prevalence.—Interdigital pilonidal sinus appears to be an occupational disease among male barbers who cut men's hair, but it does not occur among those who cut and dress women's longer and softer hair. Of the 47 cases reported, a single sinus was present in 38 and more than one in 9. The right hand alone (21 cases) was affected slightly more often than the left (19 cases), and both hands were involved in 6 cases.* Any web might be involved, but the central webs—i.e., those between the index and middle fingers (21) and those between the middle and ring fingers (14)—were affected most often. The outer webs—i.e., those between the thumb and the index finger and those between the ring and little fingers—were not often affected (1 each).

Cause.—The skin creases and finger webs of barbers' hands are softened by frequent handling of hair oils

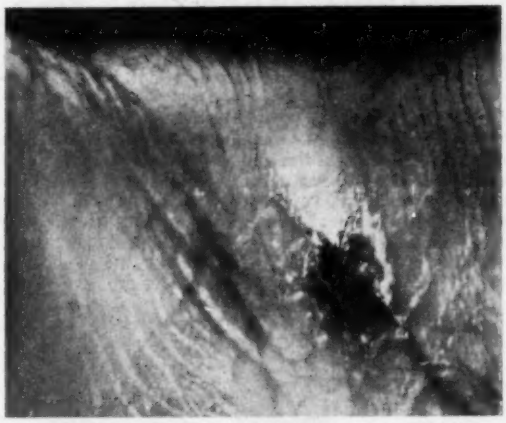

Fig. 2—Opening barber's interdigital sinus between left index and middle fingers with hairs protruding from orifice of sinus (× 5).

and lotions, which accumulate between the fingers. When the scissors are being used, pieces of hair seem to be squeezed and sucked proximally towards the web. Short pieces of hair accumulate in the webs between the central fingers, and some short bristles penetrate the skin. This leads to irritation and infection. A small abscess may form in the skin and when this bursts it leaves a depression in which hairs accumulate. Finally a pit lined by epithelium is formed in which more hairs collect, and soon a chronic infected sinus results. The entrance of hairs into the pit may take place by suction (Patey and Scarff 1948, Patey 1952); possibly the movement of the two skin surfaces on the sides of the fingers may draw or drive hairs into the pit. A similar action may cause penetration of hairs below the skin surface in the sacral region when the sides of the nates are rubbed together. Sometimes a third surface is active in this situation: the rubber seat of a "jeep"—"Jeep driver's seat" (Jones 1954)—or a rubber girdle may increase this sucking effect as well as causing friction and maceration of the skin.

* In 1 of the cases quoted by Currie et al. (1953) the side of the lesion was not stated.

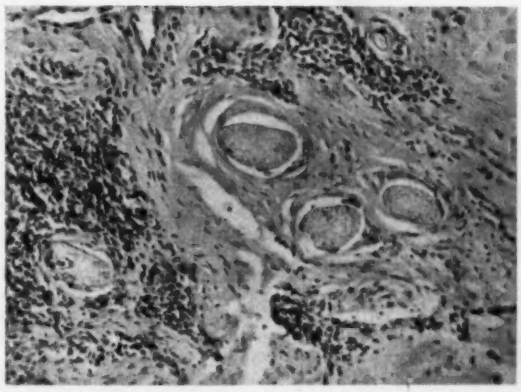

Fig. 3—Photomicrograph showing four hairs in cross-section. Hairs occupy spaces in tissues and are surrounded by inflamed fibrous tissue (× 83).

Symptoms.—In barber's interdigital sinus the symptoms may be so trivial that in most cases no treatment is sought. In others, when the irritation is troublesome and when there is recurrent pain due to accumulation of pus, the patient seeks treatment. Operation is then necessary.

Treatment.—When the patient has troublesome symptoms, complete excision of the sinus is required; the wound is sutured with fine stitches. If the pit is superficial and not associated with recurrent attacks of infection, simple hygienic precautions should be advised, and no operation is required. To prevent recurrence after operation it is advisable to warn the patient to take certain precautions. He should wash his hands carefully and frequently during the day, when he is working, so that the hairs and hair oil do not accumulate in the clefts between his fingers. While he is cutting hair, the central two webs should be covered by strips of adhesive strapping or by a quick-setting plastic paint or collodion.

Summary

A case of barber's interdigital pilonidal sinus in the web between the left index and middle fingers is described. The sinus was excised. Brief reference is made to the other reported cases.

The prevalence among male barbers appears to be about 13%. The two hands are affected about equally. The central webs—i.e., those between the index, middle, and ring fingers—also seem to be affected about equally.

When recurrent infection occurs, excision of the track containing the hairs is advisable.

The precautions which should be taken to prevent the formation of sinuses or recurrence after operation are described.

I should like to thank Dr. W. D. Mitton for referring this patient to me for treatment and Dr. W. Goldie for the pathological examination. I am grateful to Mr. J. Hainsworth for the photographs.

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Preliminary Communication

DESIGN OF AN ARTIFICIAL LUNG USING POLYVINYL FORMAL SPONGE

"Science is advanced far more by the well-informed chatter of a few like-minded friends over a cocktail than by any number of conferences."—Sir HENEAGE OGILVIE.

INTEREST in recent work on artificial oxygenators for use in cardiac surgery prompted some "chatter" in this laboratory; and we are briefly recording what came of it.

In the human lung the capillary surface involved in gas exchange exceeds 100 sq. metres. Hence, in designing an artificial lung, we have to distribute the blood in a thin film of very large area; and we also have to prevent the passage of emboli.

In such work three means of oxygenation have emerged:

1. In the *membrane diffusion oxygenator* gas exchange takes place by diffusion through a membrane which separates blood from oxygen. This method is in use where low flow-rates are acceptable.

2. In the *bubble-oxygenator* oxygen is introduced directly into blood. Bubbles in the oxygenated blood must be controlled by wetting agents or mechanically. An ever-present danger with bubble-oxygenators is the possibility of bubbles entering the patient's circulation. Also there may be drying of the blood, possibly producing protein emboli.

3. *Film oxygenators* expose a continuous thin film of blood to an oxygen atmosphere. Physical and chemical properties of the filming surfaces with respect to blood are of the utmost importance if damage to the blood is to be minimised. One instrument combines the bubbling and filming principles by trickling blood on to a layer of blood-foam.[1,2] It would be hard to find a surface more ideal than blood foam for preventing damage to blood; but the bubbling is still traumatic.

Continuous processing of blood in the extracorporeal circuit can raise the trauma to dangerous levels.

1. *Cellular trauma* (shown by the formation of plasma hæmoglobin) has been reduced by the use of chemically inert surfaces and by gentle handling of the blood.

2. *Surface denaturation of the plasma proteins* may affect important enzyme systems. Some degree of denaturation seems to take place wherever blood is in contact with foreign material, whether gas, solid, or even lipoid. There is evidence that gas is less damaging than a solid.

3. Increase in *fibrinolysin activity* may account for poor clot-retraction and an increased bleeding tendency which may be found even when heparin is neutralised with protamine after the end of an operation.

The Ideal Artificial Lung

Oxygenation must be carried out without damage to the blood, and the instrument must operate at the varying flow-rates encountered in the operating-room. The amount of blood required to incorporate the instrument into the patient's circulation must be as small as possible; this implies low priming-volume and short circulation-time. Turbulent flow of blood through the instrument must be avoided, and all materials in contact with blood must be carefully selected to minimise blood damage. There must be effective filtration without reduced blood-flow. Practical considerations demand a small, light, sterilisable, and expendable oxygenation unit of variable capacity which can be easily incorporated.

We feel that filming is the safest and most efficient method.

Experiments

Theoretically plasma is the best filming-surface for blood; and attempts have been made to provide such a surface by filming blood over blood-foam (as already mentioned) or over protein adsorbed on to plastic surfaces. A different approach would be to use an absorbent substance saturated with plasma, providing a surface on which blood will film naturally. It seemed to one of us (H. W. H.) that artificial sponges should be considered, and after experiment we decided that a sponge made of commercial-grade polyvinyl formal ('Ivalon') was the most suitable. Its pores are connected throughout and vary in size in a random manner, and it can be steam-sterilised at 120°C for two hours without deterioration. We found that dry ivalon would absorb 9·7 times its weight of blood; when this was squeezed out, 0·63 times its own weight of plasma remained absorbed.

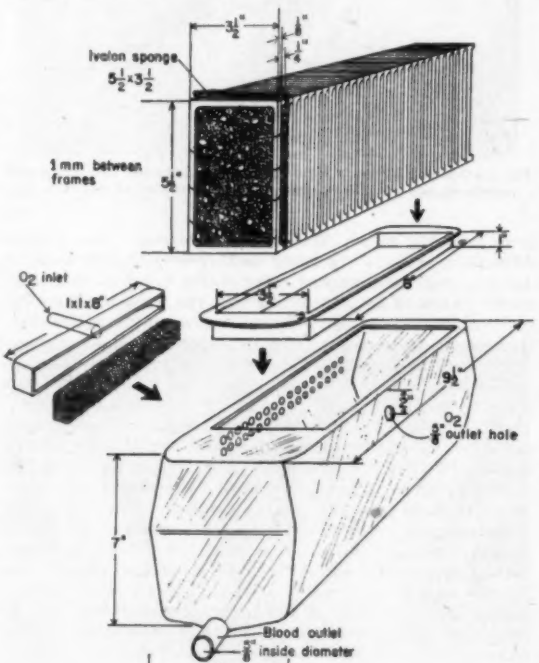
We therefore decided to build an experimental instrument incorporating this sponge.

Experimental Oxygenator

We show here an exploded drawing of the oxygenator. For convenience, the oxygenator is built up in a battery as shown at the top.

The separators are cast of candle wax in a mould and are reinforced with waxed string. Each separator is wound with nylon monofilament as shown. Ivalon in the dry state is cut into sheets as thin as possible. The battery is assembled by alternating separators and saline-soaked sponge-leaves as shown. When assembled, the separators are fixed in place with drops of hot wax. The battery consists of 26 leaves of sponge held vertically by separators so that each leaf is lightly clamped on top and bottom and held away from its neighbour by the nylon criss-cross. The battery is arranged to fit into a polyethylene tray with the bottom cut out, leaving a small ridge for fixation with wax. The completed battery with attached tray is sealed into a polystyrene container.

Blood is distributed over the top of the frames and soaks down through the sponge-leaves clamped lightly between the top bars of the separators. The blood films down the sponge and runs smoothly into the bottom of the container from the lower end of the sponge-leaves, and then to the exterior.



A constructional drawing of the experimental oxygenator.

1. Salisbury, P. F., Miller, J. H., Morgenstern, L., Hyman M. M., Shore, J. M., State, D. *Trans. Amer. Soc. for Artificial Internal Organs*, 1956, **1**, 68.
2. Waud, R. A. *Ibid*, p. 87.

The oxygen manifold is fitted with a polyurethane sponge diffuser. Oxygen passes edgewise through the battery and past the blood filmed on the suspended sponge-leaves, and is exhausted to the outside through a hole in the opposite side of the container.

The oxygenator was tested in various ways:

Four pints of citrated blood was suspended in a container above it. The priming volume of the equipment was 50–60 c.cm. Oxygen from a storage tank was blown directly into the manifold at a rate of 15 litres per minute. We found that a blood-flow of 430 ml. per minute was the upper limit for effective oxygenation with this experimental unit. (The oxygen-saturation of the flowing blood was increased from 42 to 94%.) At this flow-rate the sponge structure could still be discerned, but at higher rates the filming surfaces became overloaded, and oxygenation was inadequate. No dripping or bubbles were observed at any time. 100 ml. of the citrated blood ran through the apparatus in fifteen seconds.

DISCUSSION

Many operations on humans using flow-rates of the order of one-third of the basal cardiac output have been performed with good results, but restriction of the extra-corporeal circulation even to half the normal cardiac output still calls for an instrument capable of handling about 3 litres per minute in an adult.

We feel that a film oxygenator using ivalon sponge best approaches the human lung in operation, since in addition to superior filming qualities, it has a filtering action. Because ivalon has myriads of pores of many different sizes, the blood, in constant mild agitation, flows over a much larger surface than it would if we used a plastic sheet with a smooth surface of the same size. With the blood-flow at an optimal level, erythrocytes run over a plasma-wetted surface in a very thin film, always exposed to some oxygen, simulating a capillary flow. Ivalon has the definite advantage, over other known filming-surfaces, of maintaining a blood film even with the lowest possible flows. Over unsuitable surfaces, a film may break, even when thick enough to cause incomplete oxygenation. No revolving parts or by-pass circuits are necessary in an oxygenator using ivalon sponge as a filming surface. It can be saturated with nearly its own weight of plasma before use, and presents a blood-like surface to the blood which films over it.

The apparatus described, though experimental, promises several other advantages. It should be easy to design a closed system analogous to a closed-circuit anæsthesia machine, and by conserving water vapour this would prevent drying of the blood. An oxygenator with ivalon as a filming medium would also be easy to handle, to assemble, and to sterilise. Disposable units could be designed.

We should emphasise, however, that the instrument is not in final form. Questions remain which will have to be answered by experiment—e.g., the best size for the pores and thickness for the sponge-leaves, the area of the sponge sheet necessary to achieve useful oxygenation, and the maximum permissible blood-loading of the sponge.

SUMMARY

Existing artificial oxygenators have deficiencies. Of the three methods of oxygenation—membrane diffusion, bubbling, and filming—the last seemed the most promising. An inert, plasma-absorbing sponge (polyvinyl formal, or 'Ivalon') was tested in an experimental oxygenator and found to oxygenate reduced stored blood. A film oxygenator using this sponge as a filming surface has advantages which make it worth further examination.

Our acknowledgments are due to Dr. N. H. Lufkin, chief pathologist, St. Barnabas Hospital, for his friendly advice and coöperation; to Mr. Eugene R. Jonas, for kind help during experiments, and in carrying out the laboratory estimations; to Paul I. Wolf for his helpful suggestions in preparing this paper; and to the North Memorial Hospital blood-bank for furnishing outdated blood.

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New Inventions

A NEW TRACHEOTOMY TUBE

ARTIFICIAL respiration by intermittent positive pressure through a tracheostome is now established as a life-saving measure in poliomyelitis, polyneuritis, tetanus, and other conditions. In this form of treatment a cuffed tube is inserted into the trachea, the cuff preventing (1) air blown into the trachea from leaking up through the larynx and (2) secretions or vomit in the pharynx from entering the lungs.

It is possible to shorten an endotracheal tube for this purpose, and we have treated many cases successfully in this way; but these tubes have only a slight curve, and there are dangers inherent in their use. They are difficult to tether firmly and tend either to slip out or to slip inwards and to enter the right main bronchus, occluding the left. Moreover with an almost straight tube the trachea is constantly being lifted forwards, and we have seen a case in which such a tube was used and necrosis of two tracheal rings was subsequently found. In the Respiration Unit at Oxford we have treated 31 patients with intermittent positive-pressure respiration

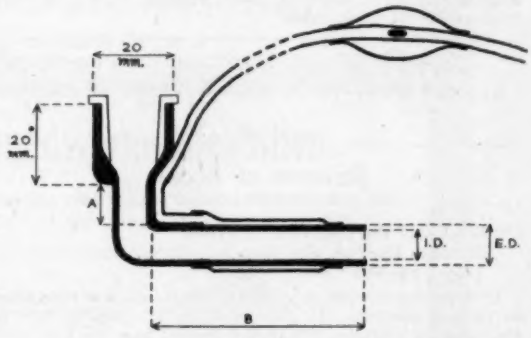

Fig. 1.

through a tracheostome and have developed the tracheotomy tube described here, which has now been extensively used and has proved to be very satisfactory.

The tube (fig. 1) is right-angled and has a longer cuffed arm which lies in the trachea and a shorter one which lies in the tracheostome and, at its free end, carries a metal insert which will accept a male Nosworthy connection. To allow for individual variation and for tracheotomies at different levels the short arm is made in two alternative lengths for each diameter of tube (see table). The side-tube to the cuff is external so that

SIZES AND DIMENSIONS

Size no.	Internal diameter (I.D.) (mm.)	External diameter (E.D.) (mm.)	A (see fig. 1) (mm.)		B (see fig. 1) (mm.)
			Set no. 1	Set no. 2	
10	9·5	13·0	13·0	26·0	60·0
8	8·0	11·0	11·0	22·0	57·0
6	7·0	9·5	9·5	19·0	38·0
4	6·0	8·5	8·5	17·0	32·0

the lumen of the main tube is not encroached on, and it is sunk into the female connection so that there is no danger of its becoming embedded in granulation tissue.

A tube of this type lies in the trachea without any distortion of the anatomy (fig. 2) or any localised pressure on the tracheal mucosa such as may cause ulceration. It cannot slip down the trachea and can only slip up it if it is displaced very considerably. Though it has been our custom to tether it with a tape round the patient's neck, it is doubtful if this is necessary. Patients needing this treatment usually lie on their side with their necks flexed, and the shape of this tube ensures that the patient's chin does not foul the connections to it. A suction catheter will pass easily down the tube and is not held up at the angle.

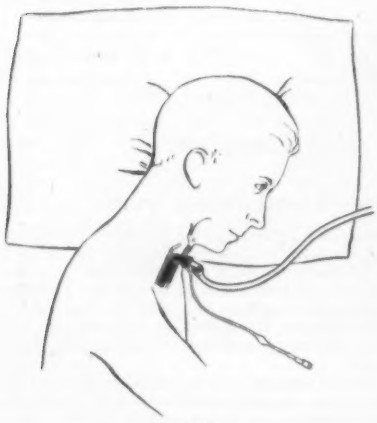

Fig. 2.

We wish to thank Mr. R. H. Salt, of the Nuffield Department of Anæsthetics, who has been largely instrumental, in association with the makers, the Leyland and Birmingham Rubber Co. Ltd., Leyland, near Preston, Lancs, in the development of these tubes.

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Reviews of Books

On the Early Development of Mind

EDWARD GLOVER, M.D. London: Imago Publishing Co. 1956. Pp. 483. 45*s*.

IN accordance with an apparently unbreakable tradition in psycho-analysis, Dr. Glover's fugitive papers, which appeared in journals, are now collected in a book.

They range from two papers on the oral phase of libido development, published in 1924, to an address on the Frontiers of Psychoanalysis delivered in Manchester in 1954; there are also introductory and other notes elucidating, correcting, or amplifying passages in the original articles. Reading these papers consecutively, and recalling Dr. Glover's other publications, one is struck by his steady growth in expository skill, his readiness to abandon an earlier position, and his critical independence. The concern with delinquency which has increasingly engaged his attention is represented mainly, but not very happily, by an ingenious paper, from 1950, on the desirability of isolating a "functional" group of delinquent disorders—a project close to some other classificatory proposals put forward by Dr. Glover but unlikely to be accepted for general use either by criminologists or psychiatrists.

Dr. Glover's lively polemical forays have sometimes obscured his merits as a psycho-analyst unrivalled among his contemporaries and juniors for vigour and quickness of mind, grasp of the principles of psycho-analysis, and freedom from the desire to conform to current orthodoxy. These qualities are well illustrated in the papers here collected; they explain why, in spite of his isolated position among British psycho-analysts, he has such an influence both here and abroad.

Comparative Anatomy of the Eye

JACK H. PRINCE, F.B.O.A., F.S.M.C., F.R.M.S., F.Z.S., assistant research professor, Department of Ophthalmology, Ohio State Hospital, Columbus, Ohio. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1956. Pp. 418. 63*s*.

IN the literature on the comparative anatomy of the eye the sumptuous volumes by Franz in German and by Rochon-Duvigneaud in French have no counterpart in English except the rather specialised study by G. L. Walls. The present volume by Mr. J. H. Prince is therefore most welcome.

It lacks the wealth of detail and systematisation of the French and German volumes, and accordingly does not replace them for reference purposes. It is, however, a pleasantly written introduction, which is all the more acceptable for its freshness of outlook. It surpasses the older texts in its attempts to relate structure to function, and, though enthusiasm occasionally outruns discretion, it is sound as well as stimulating. In addition to chapters dealing with the different anatomical structures of the eye, there are chapters devoted to special receptors, tapeta, pecten, eye size and shape, and ocular filters; and the concluding chapters deal with pineal and parietal eyes and invertebrate eyes, leading up to a discussion on possible ancestral patterns. The illustrations are particularly good.

An Introduction to Dermatology (12th ed. Edinburgh: E. & S. Livingstone. 1956. Pp. 374. 45*s*.). — The student or practitioner in need of a short but explicit text on dermatology can do no better than consult this book by Prof. G. H. Percival, of Edinburgh. The discovery that an introduction needs so many pages need not deter him, for a lot of space is devoted to the 256 pictures; 188 of these are in colour and almost all are helpful. The approach is practical, and the prescription and use of remedies are described in greater detail than in many larger books. Seborrhœic dermatitis does not exist in Edinburgh, but must those who abolish it by calling its manifestations by different names be driven to use such incomprehensible terms as "eczematide"? The inclusion of "seborrhœic alopecia" needs some justification; and the classification of Bazin's disease with sarcoid is perhaps open to question. But these are minor criticisms of a useful and up-to-date production.

Pye's Surgical Handicraft (17th ed. Bristol: John Wright & Sons. 1956. Pp. 816. 52*s*.).—There is a trend in clinical teaching today towards fundamental issues with an emphasis on basic science, for only thus can a student be equipped to meet the rapid changes in our approach both to medicine and its problems, and to treatment; the didactic lectures of a decade or two ago are not adequate. Nevertheless a student must be able to undertake the procedures of his craft; and before qualifying he has insufficient opportunity to see and learn all that he will need even in his preregistration year. The alternative is to be able to turn to a clear account of technical methods when occasion arises. "Pye," edited by Mr. Hamilton Bailey, covers such a wide and useful range that it should be in the hands of every student; and it is of value to a doctor throughout his practising life. In its seventy-third year and 17th edition, this work still has no equal.

Emergencies in Medical Practice (5th ed. Edinburgh: E. & S. Livingstone. 1956. Pp. 684. 37*s*. 6*d*.).—Many doctors (and patients) have reason to be grateful to Dr. C. Allan Birch and the other contributors to the excellent book he has edited since 1948. The appearance of five editions in eight years is one clear mark of its renown; and another is the steady flow of readers' suggestions which, Dr. Birch says, have been very valuable in bringing the book up to date.

Progress in Neurobiology (Amsterdam: Elsevier Publishing Company. London: Cleaver-Hume Press. 1956. Pp. 384. 65*s*.).—The proceedings of the first international meeting of neurobiologists, which was held at Amsterdam last year, have been published under the editorship of Prof. J. Ariëns Kappers. The contributors from this country included Dr. Turner McLardy, Mr. G. W. Pearce, Mr. D. A. Sholl, and Prof. J. Z. Young, F.R.S.

Family Mental Health and the State.—The proceedings of the meeting of the World Federation for Mental Health, held at Istanbul last year, have been published. Copies (Pp. 165, 20*s*.) may be had from the federation, 15, Manchester Street, London, W.1.

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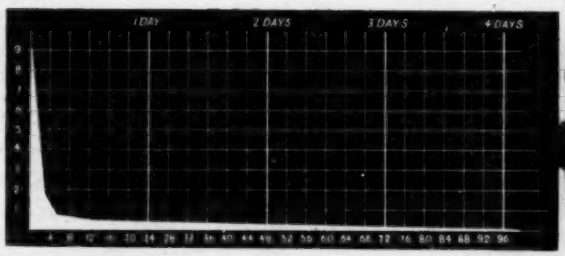

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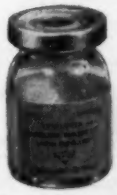

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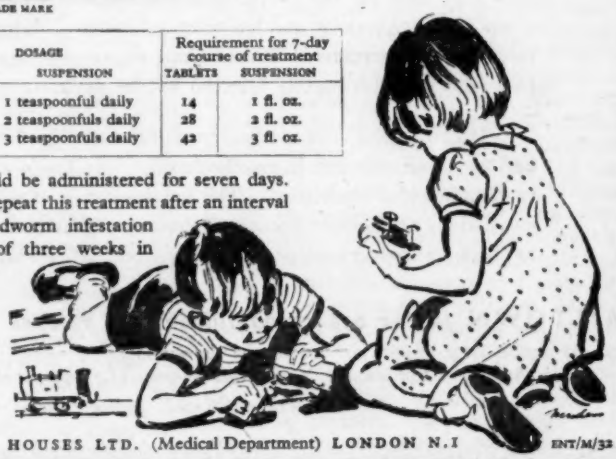

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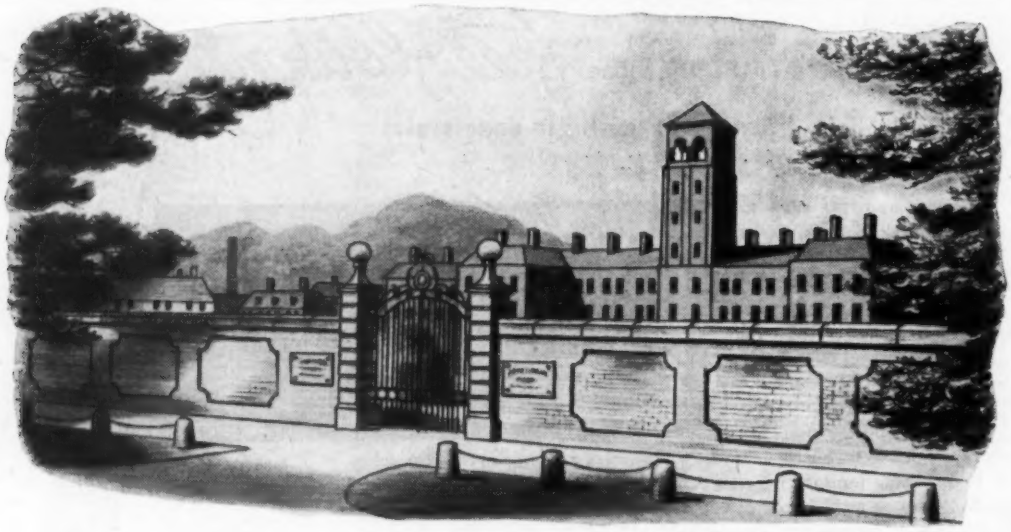

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A Balance of Risks

PARALYTIC poliomyelitis in a recently injected limb was noted by MARTIN [1] as a complication of penicillin therapy; and it appeared from this and other observations that injections of all kinds may precipitate paralysis. This is a risk which may have to be run in an emergency; but when inoculation against serious infectious diseases is a matter of deliberate choice and timing, the precise balance of risk must be even more carefully assessed. Although later work has confirmed MCCLOSKEY'S suggestion [2] that prophylactic inoculations are causally related to paralysis in the injected limb, GEFFEN'S rough estimate [3] of the risks involved (1 in 1800 to 1900) has never been satisfactorily followed up. Because of the wider implications, the Medical Research Council set up a committee, under the chairmanship of Dr. G. S. WILSON, to examine these early suggestions and to assess the relative risks involved in the use of the various prophylactics against diphtheria, whooping-cough, and smallpox. Their report, published in this issue, results from that intimate collaboration between public-health workers in central and local government and academic departments which is proving increasingly valuable in epidemiological research. In these far-flung surveys, the integrative action of the secretaries, performed here by Dr. W. C. COCKBURN and Dr. J. KNOWELDEN, is essential to success.

The novel feature was the assembly from all the large urban areas covered of complete data on the nature and number of inoculations given in clinics in every month of the period of the survey from May, 1951, to December, 1953. Intensive field work then determined the precise dates of inoculation, the inoculum used (if any), and the date of onset and clinical type of the poliomyelitis in all cases reported in these areas during that time. The analysis then proceeded in two stages. The concentration of paralysis cases (42% between the 8th and 14th days after inoculation) confirmed the earlier suggestions of cause and effect; and this result, observed in children receiving only a single reinforcing dose, was no statistical artefact. In comparing the risks of paralysis at different lapses of time after inoculation, the committee have been particularly circumspect. A group of children newly vaccinated in May, for example, would have more chance of being attacked by poliomyelitis three months later at the height of the epidemic than in the month of June immediately after their injection. To prevent the relative hazards being obscured in this way by seasonal changes in both inoculation and poliomyelitis, the committee first assumed that the natural hazards of infection were similar and constant for all exposed to risk during the same four-week period. They then compared the relative frequency of paralysis among children exposed during these four weeks who had had different vaccines or who had been inoculated either within the previous twenty-eight days or in the more distant past. The unbiased estimates of relative risks thus obtained are of great importance.

The basic attack-rate for poliomyelitis unrelated to inoculation was, for the age-groups included in this study, 1·3 per 100,000. The attack-rate during the initial twenty-eight days after inoculation was, in general, 4·0 per 100,000, although it varied with the vaccine used and the season of its administration. The technique of administration seemed to be irrelevant. Of the 1308 paralytic cases in children between six months and two years of age, reported in England and Wales during this period, 170 (13%) might reasonably be thought to be associated with inoculation. At older ages, the proportion is unlikely to be much over 2%. Here, then, is a real problem of public health—how to strike a balance between the risks of prophylaxis and the hazard it aims to prevent. Fortunately, the study itself may suggest some answers. It seems clear, for example, that the general risk is not so great as had once been feared. On the other hand, although the numbers upon which these distinctions are based are small, there are obvious differences between the preparations used. The comparative safety of formol diphtheria toxoid and plain pertussis vaccine when used alone disappears when they are mixed. The dangers inherent in alum precipitation have been re-emphasised, but the risks of formol toxoid and T.A.F. are little above expectation. Vaccination against smallpox seems to have no particular effect on the attack-rate.

For whooping-cough and smallpox then there is, on this score at least, no problem, since the benefits of prevention far outweigh the apparently negligible risks of paralysis. Diphtheria, however, presents greater difficulties. Certainly, the recent rapid decline in diphtheria morbidity and mortality probably represents the tail of a dying epidemic. But, as a concentration of cases in the vulnerable group of pre-school children suggests,[4] the tail may yet show its sting. At 1950–54 rates, the additional chance of a non-immunised child under the age of fifteen dying during the five years of life when he might have been protected by immunisation is at least 1 in 100,000. With a judicious selection of timing and material, the risk of provoking paralysis by immunisation should be no greater. Until the conquest of diphtheria is complete, we might well adopt the inferences in the committee's report—by continuing the immunisation of vulnerable age-groups, using the vaccines with the greatest apparent safety, and restricting immunisation to the months from November to March when the risks are lowest. This course is based on experience in the recent past, and will

1. Martin, J. K. *Arch. Dis. Childh*, 1950, **25**, 1.
2. McCloskey, B. P. *Lancet*, 1950, i, 659.
3. Geffen, D. H. *Med. Offr*, 1950, **83**, 137.
4. Report of Ministry of Health for 1954. Part II. H.M. Stationery Office, 1955.

therefore need continued reassessment in the light of the changing epidemiology of the two diseases concerned.

The Sense of Smell

THOUGH the sense of smell in human beings is far less acute than in many animals, it still plays an important part in our lives, giving warning or pleasure, or aiding in the development of conditioned reflexes. Some idea of the relative importance of smell to different species can be gained by measuring the proportion of the cerebral cortex which is devoted to its analysis and perception. In fishes and amphibians the olfactory region may occupy nearly a sixth of the whole brain, and in some mammals as much as a quarter of the cerebral cortex. The olfactory system seems to be an old one in the evolutionary sense, and over a wide range of vertebrates its structure is basically the same. Less is known about olfaction than the other senses partly because it was for some time neglected and partly because it is particularly hard to investigate. The sensory end-cells are crowded together, and the nerves arising from them are fine and non-medullated, so that they are difficult to demonstrate histologically or to study electrically, and the olfactory centres are not easily accessible. But information can be obtained experimentally in various ways: for example, parts of the central nervous system thought to be related to the sense of smell can be removed to see what effect this has on nerve tracts, behaviour, and the ability to form or maintain conditioned reflexes.

In man the olfactory area automatically comes into contact with both inspired and expired air, which is not the case in all animals. The actual sensory epithelium lies on the conchæ and occupies some 6 sq. cm. on either side. In this area are packed masses of long cells whose nuclei lie deep to the surface and from whose exposed ends fine hairs project into the mucus and fluid bathing the nasal membranes. Scattered among the sensory cells are the small openings of Bowman's glands whose secretion spreads over the epithelium. The composition and function of this secretion are unknown, but since the glands are found only in the olfactory area it is apparently important. Another feature of all olfactory areas in all species is that they are pigmented yellow or brown and that acuity of smell is related to the depth of pigmentation; thus, for instance, albinism and anosmia are related. The fine nerve-fibres arising from the sensory cells run in bundles through the ethmoid bone and spread over the surface of the olfactory bulb. In the bulb lie well-defined spherical bodies called glomeruli, in the neighbourhood of which the nerves from the receptor cells make their first synapse. Each glomerulus is linked peripherally with fibres from many receptors but centrally with far fewer second-stage neurones, so that this is a converging pathway, or concentrating mechanism, which may add greatly to the acuity of smell.[1] The further pathway is complex and partly crossed.

Man, to whom smell is of limited importance, can nevertheless distinguish between thousands of different odours; but how he does so is by no means clear. Histologically the sensory cells look alike so that it is not possible to base a system of selective reception on structural grounds. Discrimination may in small part be due to topographical factors. During ordinary respiration a number of receptors scattered over the unspecialised part of the nasal mucous membrane receive, and can react to, various general chemical stimuli, such as acid or ammoniacal vapours. A sniff will carry the inspired air into deeper parts of the nasal cavity where the special cells lie, and according to the distribution of the air and the type and solubility of the odorous material, so a varying number of the cells will be more or less stimulated.[2] Moreover, discrimination may partly depend on the accessibility of receptors and on the rate of diffusion of odorous particles. ADRIAN [2] found that organic esters tend to produce a rapid response in the front of the mucous membrane and the hydrocarbons a slower one at the back. This hypothesis immediately comes up against the fact that in man the cells are all more or less equally accessible and yet he can recognise many different smells. As well as the spatial discrimination suggested by ADRIAN, there may be chemico-structural differences in the cells which enable them to respond differently to different substances; and, in fact, ADRIAN has produced evidence in support of this view. Using odorous substances in high dilution, he found that they varied in the threshold concentration at which they evoked a certain type of axon spike from cells which also differed in the latent period of their response.[3] ADRIAN was working on rabbits, but this was the first direct evidence that there may be more than one type of olfactory receptor cell. Another supporting point is found in preferential anosmia in which the ability is lost to appreciate certain smells but not others. Other theories of olfaction are based on the physical (water or lipoid solubility) or chemical properties of the odorous substances. The receptor cells are probably stimulated by particles of the odorous substance, of which only minute amounts are needed to give the sensation of smell. MONCRIEFF [4] calculated that the number of molecules thrown off by muscone (in musk) is sufficient to stimulate smell, yet involves a loss of weight of only 1% in a million years. Thus the particulate theory of smell is not discounted because the loss of weight cannot be measured. BARADI and BOURNE [5] lately suggested that odorous substances may initiate impulses by inhibiting one or more of the enzyme systems present in the receptor cells.

In common with other senses, smell is subject to adaptation, and moreover, a particular odour may increase or decrease the sensitivity to another odour that follows it. MONCRIEFF [6] has tried to determine the chemical nature of substances bearing this type of physiological relationship. It has been suggested that all odours are built up of a small number of fundamental ones: thus, if two smells have a fundamental odour in common each should exert a strong adaptation effect on the other. If the underlying hypothesis is untrue, then severe adaptation would never be observed with a pair of noticeably unlike smells. MONCRIEFF found that nearly similar smells —e.g., amyl and butyl acetate—did cause confusion

1. Allison, A. C. *Biol. Rev.* 1953, **28**, 195.

2. Adrian, E. D. *Electroenceph. clin. Neurophysiol.* 1950, **2**, 377.
3. Adrian, E. D. *J. Physiol.* 1951, **115**, 42P.
4. Moncrieff, R. W. The Chemical Senses. London, 1944.
5. Baradi, A. F., Bourne, G. H. *Nature*, 1951, **168**, 977.
6. Moncrieff, R. W. *J. Physiol.* 1956, **133**, 301.

in detection when smelled one after the other, showing that similar smells from different chemical entities clearly share a part of the olfactory apparatus. He also found that self-adaptation was always more powerful than heterogenous adaptation, sometimes even when the heterologous pair were as similar as *n*- and sec-butanol. Self-adaptation with *n*-butanol raised the threshold some 200 times, but adaptation with sec-butanol raised the threshold to *n*-butanol only 12 times. Some similar smelling pairs behaved to each other rather oddly: adaptation with A might have a much greater action on the threshold concentration of B than adaptation with B had on A. Allowing that the primary stimulus consists of the adsorption of the odorous molecules on the olfactory membrane, this apparent anomaly can be explained by a spatial pattern of adsorption and by differing numbers of receptor sites for A and B, only some of which are held in common. Occasionally a fair degree of adaptation can be exerted for one substance by another with a dissimilar smell, which suggests that there may be a small proportion of the olfactory apparatus which is used by all smells. Adaptation seems to be central rather than peripheral; for instance, unilateral stimulation can cause bilateral fatigue. According to ADRIAN,[2] the olfactory bulb is in a constant state of electrical activity, which is temporarily disorganised by the receipt of sensory impulses. With a persisting smell he found no sign of receptor fatigue, but central activity built up again and swamped the transmitted olfactory signals. Theoretically, then, self-adaptation should be severe, as MONCRIEFF found it to be. Experiments involving ablation or stimulation of central areas showed clearly that there are two distinct olfactory systems—one cortical and the other subcortical.[1] The cortical system is concerned with judgment and fine discrimination and the subcortical one with simpler discrimination and more automatic activities.

The significance of a sense of smell is easier to define. In the lower animals it helps them to find their food and their mates, and to avoid their enemies; and it has presumably developed from the primitive chemical sensibility of unicellular organisms. By means of specially developed glandular secretions scent may act as a deterrent to aggressors, as it does in the skunk. There is also some evidence that poisonous food may be recognised by smell. In man the significance of smells is largely acquired and becomes built into the unconscious or automatic part of the nervous system. To man smells are useful in stimulating a good preparatory flow of gastric juice and in giving æsthetic and remembered pleasure. Those who have by accident lost the sense of smell know how much it adds to the savour of food. What the anosmic loses on coffee he gains on castor-oil, but the price is too high. Finally, in animals scent plays a large part in initial reproductive processes. FABRE[7] drew attention to the remarkable way in which some moths and butterflies can trace the scent of their mates over long distances. WHITTEN[8] has described how removal of the olfactory bulbs from mice significantly reduced the size of reproductive organs in the female, but not in the male, and how the females would not then mate even with vigorous males.

7. Fabre, J. H. Social Life in the Insect World. 1912.
8. Whitten, W. K. *J. Endocrin.* 1956, **14**, 160.

Annotations

WAITING FOR THE DOCTOR

THE esteem in which the public holds its hospital services is easily influenced by other things than the skill and care shown in the treatment of patients. The patient who has to wait an hour to see the doctor, especially when he has been told that he has an appointment for a specified time, is likely to be more impressed by this than by the success of the consultation. Doubtless the present arrangements are a big improvement on the "good old days" when all outpatients had to attend at 8 A.M., and might not be seen till late in the afternoon; but letters to the newspapers and complaints to hospital administrators show that long waits in outpatient departments have certainly not been eliminated. They cause the patient irritation and the community loss of working time. A working party of the Hospital Discussion Group has recently examined the ground for these complaints, and its report[1] suggests general remedies. Two approaches can be discerned: (1) to disarm criticism; (2) to improve the efficiency of clinic arrangements and really reduce waiting-time.

The working party objects to the term "appointments system" because it gives a false idea of precision, and suggests "clinic booking system" as a substitute. By this means and also by putting the hospital point of view in the press and in notices on the attendance cards, it is hoped to make the public more tolerant of inevitable delays—some of which are in fact caused by patients who arrive early or late. But few patients will be thus convinced that a long wait is really necessary, and they will go away feeling that some better system could be devised. And most of the report does in fact deal with suggested changes in the arrangements. An important cause of delay is inconvenient timing of public transport (especially in the country) and the need for economy in the ambulance service. The transport authorities might be able to change their services, or bookings might be better arranged to fit the existing time-tables. Ambulances, it is suggested, should be allocated to large general hospitals, with a transport officer for each hospital, who could be in touch with those arranging clinics; for example, some booking-times could be reserved for patients from a certain district.

Many outpatient departments are in old and inadequate buildings, and the administrative services could be more efficient if they had enough staff, space, and equipment. Records offices and X-ray, physiotherapy, and other special departments are often in inconvenient positions, and patients waste much time going to and fro between them and the outpatient department. Members of house-committees should regularly visit the clinics and confer with the doctors and nurses about ways in which these impediments could be overcome.

The most intractable delays are probably due to events within the outpatient clinics. Obviously, it will never be possible to predict which consultations will take longer than others; the consultant may have to see an unbooked urgent case in the clinic or he may be called away to one; or other doctors may interrupt the clinic to confer with him. If the patient is sent for an investigation, when he returns he makes, in effect, a second, unbooked, attendance. To make the wheels turn as smoothly as possible, the last part of the clinic session should be set aside for patients booked late or not at all. Ancillary services, the working party maintains, should be provided during the whole period of the clinic.

The report says that most clinicians are punctual in starting their clinics. They can help further by taking an interest in an agreed policy and sticking to it, by insisting on seeing patients in the order in which they

1. *The Hospital*, 1956, **52**, 575.

have been booked, and by confining other activities during the clinic hours to the minimum needed to deal with urgent cases. The best possible scheme can succeed only if everyone concerned (doctors, nurses, administrators, and patients) do their best to make it work.

The working party hopes that, by adopting the proposals, all hospitals could do as well as those "in which good systems are in force" and where "the average wait before a patient sees a consultant is not more than 30 minutes." Perhaps this is the best that can be hoped for, but some people will not think it good enough.

PATENT DUCTUS ARTERIOSUS

CLOSURE of the patent ductus arteriosus, the first form of surgical attack on congenital heart-disease to become a routine operation, is now one of the commonest tasks of the cardiac surgeon. Few physicians hesitate to advise it once the diagnosis is certain, because it is curative and safe. Hay and Ward [1] have lately reviewed in detail their experiences with patent ductus during the four years 1949–53. They choose to discuss patients over the age of one year and they deal with the diagnostic and surgical problems involved. So much doubt has been cast on cardiologists' obiter dicta by the findings of the surgeons that it is agreeable to see a large well-documented series in which the preoperative diagnosis was so often right.

The incidence of patent ductus varies in the different series that have been reported, because they refer to different age-groups. Any series with a high proportion of infants will have fewer instances of isolated patent ductus arteriosus, since it will include many infants with multiple anomalies and rapidly fatal conditions. Accurate diagnosis is most difficult in infants not only because of the many other malformations to be considered but also because auscultation, electrocardiography, and radiology give less definite help than in older children. In a large, representative group of patients, which included many infants, Gasul [2] found that patent ductus accounted for almost 10% of congenital heart-disease—a similar figure to that in Maude Abbott's celebrated collection of post-mortem observations.

In the typical case diagnosis is easy. The clinical picture of a girl with a continuous murmur over the pulmonary area, accentuated in systole, a thrill, and probably a collapsing pulse is unlikely to be missed even by those not on the lookout for the disorder. But there are traps in the path to diagnosis. Bonham Carter and Lovel [3] have recorded examples of patent ductus in which atypical murmurs were heard and the usual machinery murmur was absent; and in a contrasting series [4] there was a continuous murmur in the pulmonary area without a patent ductus or any of the usual causes of such a murmur. The premature infant with an enlarging but failing heart may well have this remediable condition, but a commoner finding is simply a systolic murmur which will not become continuous until later in life. In such circumstances retrograde aortography may be necessary to prove the diagnosis. Between 20 and 25% of children with patent ductus die in infancy and Zeigler [5] has emphasised the importance of recognising it early in life. To persist in medical measures may be a fatal mistake.

Pulmonary hypertension may also be an indication for urgent surgery and it is vital to recognise this complication. Again the murmur is often systolic only, and the electrocardiogram shows right-ventricular preponderance only in advanced cases. Where there is real doubt cardiac catheterisation is needed. Pulmonary hypertension increases the risk of operation, but it is probably justifiable to intervene when the pressures are evenly balanced on the systemic and pulmonary sides. Pressures can also be measured directly at operation, and the final test is a trial occlusion. If there is a reversal of the shunt the operation should be abandoned since in these cases the mortality is 50%, even in the hands of the Mayo Clinic team.[6] Severe pulmonary hypertension is thus the principal contra-indication to operation.

At the other end of the scale is the apparently healthy child whose lesion is identified at a routine examination. Why operate on an asymptomatic and otherwise normal patient? Blalock's answer is "to protect the heart from an eventually disabling burden." [7] Though there are exceptions, the expectation of life is much shorter than normal even if we exclude the constant threat of subacute bacterial endocarditis (of which there is a 10% risk). Patent ductus is a "time bomb with a very long fuse." Between three and seven years of age is a convenient time for the elective operation. In Hay and Ward's series there was no death due to ligation of the uncomplicated ductus, and Potts operated on 250 consecutive cases without a death. The commonest cause of disaster seems to be misdiagnosis.

As for the type of operation, most American surgeons favour division of the vessel, while their British and Continental colleagues are content to ligate in continuity. Gross,[8] the first man to close a patent ductus successfully, gave up ligation after some recurrences and Potts [9] has also abandoned the simpler method. Ekstrom [10] found that recurrence could follow both ligation and division, but that it was less likely with division. Infection was an important cause of recurrence. The proportion of recurrences after ligation varies greatly from one series to another, depending to a considerable extent on the nature, calibre, and tensile strength of the ligature material. A single thread is less likely to be effective and more likely to cut through than two pieces of large Chinese-silk twist. Blalock, of Baltimore, and Mustard, of Toronto, choose suture ligation reinforced by umbilical tape. The question of ligature or division will take another decade to settle: at the moment it seems that most forms of patent ductus can be safely and effectively tied, but there are others which should be divided; the surgeon must be prepared to do either. As a rule, the short wide ductus is difficult to occlude and should be divided.

SERUM HEPATITIS AFTER DENTAL INJECTIONS

THE parenteral administration of human blood, plasma, or plasma derivatives is occasionally succeeded, after a long incubation period, by the appearance of a condition very like infective hepatitis. Work depending entirely on the use of volunteers as test animals has definitely established that this serum-transmitted disease is due to a virus of remarkable infectivity and resistance to adverse environmental conditions. Moreover, it can survive in the human host for many years [11] without giving any sign of its presence until it is inoculated into another susceptible host. Since homologous-serum jaundice has been experimentally transmitted by as little as 0·0001 ml. of serum, it is not surprising that many small epidemics have been caused by faulty sterilisation in places where many patients are given therapeutic or prophylactic injections. Indeed, the infectivity may be so great that those handling blood or blood products run a distinct risk of contracting the disease.[12]

Serum-transmitted jaundice can result from almost every kind of skin penetration, therapeutic or otherwise; and it is remarkable that injections of local anæsthetics for dental operations seem so far to have escaped blame. But the results of an investigation by Foley and Gutheim,[13]

1. Hay, J. D., Ward, O. C. *Arch. Dis. Childh.* 1956, **31**, 279.
2. Gasul, B. M., Fell, E. H. *J. Amer. med. Ass.* 1956, **161**, 39.
3. Bonham Carter, R. E., Lovel, K. *Gt. Ormond St. J.* 1953, **6**, 93.
4. Bonham Carter, R. E., Walker, C. H. M. *Lancet*, 1955, **i**, 272.
5. Zeigler, R. F. *Amer. Heart J.* 1952, **43**, 553.
6. Ellis, F. H., Kirklin, J. W., Callahan, J. A., Ward, E. H. *J. thorac. Surg.* 1956, **31**, 268.
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10. Ekstrom, G. *Acta. chir. scand.* 1952, suppl. no. 169.
11. Stokes, J. jun., et al. *J. Amer. med. Ass.* 1954, **154**, 1059.
12. Trumbull, M. L., Geiner, D. J. *Ibid*, 1951, **145**, 965.
13. Foley, F. E., Gutheim, R. N. *Ann. intern. Med.* 1956, **45**, 369.

at Rochester General Hospital, New York, illustrate how jaundice can follow such injections. During two years between 1953 and 1955 50 cases of what appeared to be ordinary infective hepatitis were seen at that hospital. 15 of these patients gave a history of dental injection received between one and six months before the onset of their illness, 16 denied such injections, and in 19 cases data were not available. In a control group of 68 random medical cases and in a second control group of similar cases matched for age with the 50 hepatitis patients, a similar history of dental injections was obtained only 3 times in each group. The proportion of dental-injection patients in the hepatitis group was therefore almost six times that in the control groups. In further support of their view that the 15 people with a history of dental injections were suffering from serum hepatitis, Foley and Gutheim cite the several clinical features that help to distinguish the two varieties of infective hepatitis, such as incubation period, type of onset, and mortality. In all 15 illnesses these points favoured the diagnosis of homologous-serum jaundice.

Those who have investigated the epidemiology of hepatitis in the past may have failed to appreciate the significance of dental injections for two reasons. First, patients, asked about recent injections or other skin-penetrating operations, almost invariably forget a visit to the dentist unless they are specifically asked about it. Secondly, when a patient gets jaundice after an injection by his doctor, he will often consult the same doctor; but a patient is unlikely to tell his dentist about an attack of jaundice that comes on many weeks after his last dental visit.

Further analysis of the data from Rochester suggests that 30% of cases of infective hepatitis may arise from serum transmission; of these, Foley and Gutheim say, two-thirds may follow dental injections. The size of the sample from which these figures are derived is such that we cannot with certainty ascribe to them more than a local significance; but these findings have shown that there may be a sizeable risk associated with even the simplest dental operation undertaken with faulty sterilisation. Chemical methods of sterilisation of needles and syringes are unreliable and obsolete, and the multiple-dose bottle of local anæsthetic is an invitation to trouble.

BRONCHOGRAPHY OR TOMOGRAPHY?

IN the treatment of tuberculosis, bronchostenosis and bronchiectasis with a persistently positive sputum are often regarded as points in favour of resection. When resection has been performed after satisfactory chemotherapy, there has often been little evidence of residual tuberculosis. The frequency of bronchiectasis is variously put at from 40 to 80%.[1] It is usually seen in long-standing disease, moderate to advanced conglomerate disease with fibrosis, tuberculous endobronchitis, and bronchostenosis due to pressure from caseous glands. The advent of propyliodone (aqueous 'Dionosil') overcame the chief objection to bronchography in tuberculosis[2] and large series of bronchograms have been reported. Propyliodone is readily absorbed and leaves no residue to make future comparison of chest films difficult, and it is an aqueous solution, so that the risk of granuloma is removed, rare though it must be even with oily solutions. But it is more difficult to use in outpatients than the iodised-oil type of medium, and flooding of the alveoli may mar the detail in the radiograph. Juhl et al.[3] have compared 100 bronchograms with tomograms of the same patients in an attempt to assess the value of tomography in demonstrating bronchiectasis. Diagnosis by tomography was easiest in the chronic fibrotic type of tuberculosis, in which 80% accuracy was achieved, and least successful in early and small lesions. After a thoracoplasty, tomography results also proved disappointing compared with those of bronchography. Juhl et al. based the diagnosis of bronchiectasis on changes in wall thickness and lumen. When bronchi were thick-walled or brought into contrast by surrounding airless lung, and when they lay in the plane of the tomographic section, the diagnosis was easy; but when they were seen end on, it was hard to judge whether there was an increase in calibre. Juhl et al. would recommend tomography for the demonstration of bronchiectasis only when there are strong contra-indications to bronchography.

1. Olson, D. E., Jones, F. S., Angevine, D. M. *Amer. Rev. Tuberc.* 1953, **68**, 657.
2. See annotation, *Lancet*, 1953, ii, 1347.
3. Juhl, J. H., Alt, W. J., Wusserburger, R. J. *Amer. Rev. Tuberc.* 1956, **74**, 388.

SURGICAL TREATMENT OF EPILEPSY

FOR over twenty-five years Prof. Wilder Penfield has been concerned with the surgical treatment of epilepsy. His approach has never been simply that of a surgical technician, and he has made his surgical explorations the basis for studying the functions of the living human brain. For much of this time he has been assisted by Prof. Herbert Jasper's extensive knowledge and imaginative application of electrophysiology. The result is a unique collection of observations, carefully assessed and interpreted, for which all those who are interested in the function of the human cortex are deeply in their debt. Some of the work has been concerned with the details of surgical procedure—the gradual additions to the technical excellence of cerebral surgery, which will, incidentally, give wider opportunity for observation. Other aspects of Penfield's work, such as his evocation of "memories" by cortical stimulation, had a more dramatic quality and appealed directly to a wider audience than that of medicine.

From time to time reports on the results of surgical treatment of epilepsy have come from the Montreal Neurological Institute, and one of them includes a survey[1] of 234 patients treated in 1945–50. All these patients had previously had long and unsuccessful medical treatment for their epilepsy. The results are impressive: 45% had their seizures abolished or very largely reduced; and in a further 20% fits were substantially curtailed. That these figures represent cure rather than temporary alleviation is shown by the proportion of patients completely free from attacks, which varies between 40% and 48% in each of seven postoperative years.

The basic cause of epilepsy—what makes a certain bit of cortex fire off a seizure—has always been of particular interest to Penfield. Simple damage to brain tissue does not explain it, since areas apparently equally damaged may cause seizures in one patient and not in another. The answer continues to elude us; but the picture of damaged cortex as a stimulus to focal or generalised epilepsy has been extended by the suggestion[2] that some seemingly idiopathic epilepsy is really due to firing from an area in the inferomedial aspect of the temporal lobe damaged by compression or ischæmia during the process of birth. This view still requires wider confirmation, but much clinical observation tends to support it, as does the increasing accuracy with which the electrical discharge in such seizures is being localised. And the suggestion has certainly opened up considerable therapeutic possibilities.

In this country at present the surgical treatment of epilepsy is not widely practised; but it will inevitably expand, and there are signs that it is already doing so. We hope it will be guided by Penfield's spirit of scientific humanism: "the clinician must often make the best compromise with perfection that he can. He must understand the patient and his hopes before he presumes to decide on treatment. But this is, after all, the secret of the art in the practice of medicine."

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Special Articles

DAY FOSTER-CARE AND THE NURSERY*

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NEUROSIS, or emotional disturbance, is the largest problem of mental health and of community living and affects probably 30% of the population (Fraser 1947).

Neurosis in the adult always has its roots in childhood. This fact emphasises the importance of healthy unstressful childhood and leads inevitably to an attempt to treat the condition at its source—hence child psychiatry.

In treating the child the psychiatrist has to deal with the emotional stress emanating from the parents. This stress does not spring from wilful intent: the parents wish well but are handicapped by their personalities. They are unhappy at their own lack of success and glad to accept help.

Often the parents can be helped to overcome their emotional handicaps so that they are free again to have the harmonious relationships with their children that they so much desire. Sometimes, however, this is impossible, or it may take a long time. If so, it may be necessary to cut down, permanently or temporarily, contact between parent and child. In such a case it is not enough merely to remove the child from the focus of stress; positive help must be given to the child.

Parent-child Separation

Separation from parents is often thought to cause mental illness in children; but the results of an investigation by us at Ipswich (Howells and Layng 1955) do not confirm this belief. Not only was separation for any considerable length of time an uncommon experience for a child under 5 years of age but also the amount of past separation was not significantly greater for a group of neurotic children than for a group of healthy children. Indeed, the findings suggested that the great majority of disturbed children became disturbed from too much contact with very present parents.

The issue has been confused somewhat by the fact that many of the studies on separation have been conducted on children in institutions, separated from their parents for long periods. At any one moment only 1 child in every 200 is in institutional care. The findings pertinent to this small minority have wrongly been applied to the majority.

Separation per se is not synonymous with deprivation. Separation leads either to deprivation or to satisfaction, according to the circumstances. Hospital care is often a traumatic experience for the child (Howells and Layng 1956), but to some children it can be pleasurable. The factors concerned are the all-important quality of substitute mothering given to the child; the degree of disturbance before admission; the preparation of the child before admission; the extent of the traumatic procedures in hospital; the acceptance of the child on his return to the family; and daily contact with the parents.

It has been suggested (Bowlby 1946) that affectionless delinquents are likely to have suffered long periods of separation in the past. The case-histories, however, usually make it clear that these children were liable to severe emotional trauma before separation. They were, further, unfortunate in these separation experiences; the substitute care, being unsatisfactory, aggravated an already existing emotional disturbance. Had there been satisfactory substitute care, these delinquent children would not have come for examination. Few statistics are available on the therapeutic aspects of separation. In a recent paper (Bowlby, Ainsworth, Boston, and Rosenbluth 1956) the Tavistock Clinic workers have modified their previous views. They now conclude that "some of the workers who first drew attention to the dangers of maternal deprivation resulting from separation have tended on occasion to overstate their case. In particular, statements implying that children who experience institutionalization and similar forms of severe privation and deprivation in early life *commonly* develop psychopathic or affectionless characters are incorrect."

It is sometimes suggested that the broken home is responsible for emotional disturbances in the child. But it is the conditions in the home before the break, rather than the break itself, that are responsible. The child from a broken home suffers more from the home than from the break.

I am convinced that there are times when parent-child separation, temporary or permanent, becomes necessary for the proper care of the child. There can be few child psychiatrists who do not spend much time in arranging for such substitute care. It is sad to think that children born haphazardly to unwanting, harsh, rejecting, and hurtful parents—however blameless these may be—must persist in this damaging situation because of an alleged magical quality in the natural parent. The child needs *a* mother rather than *the* mother. This is not to deny that the stable natural parent usually gets off to a better start, and that this relationship calls for no interference in the great majority of instances. Successful parenthood depends ultimately, however, on the quality of the parent, natural or substitute.

Separation should never be entertained without the willing coöperation of the parent concerned. We must see the parents as blameless victims of a fortuitous process. If the community looks at it in this way then so will the parent. This will lead to a much reduced feeling of guilt on the part of the parent, willingness to obtain help, and coöperation in arranging care for the child. In turn this leads to less interference when satisfactory arrangements have been made.

Day foster-care is one form of temporary substitute parental care for the child.

Day Foster-care

Problem families show an accentuation of all the difficulties met by the family. Faced with some of their intractable situations, we found ourselves from time to time at Ipswich wishing to remove children from their stressful environments (Howells 1956). Too often we were faced by certain difficulties: the parents wished to retain their child; no suitable foster-home was available and the cost of substitute residential care is very high. We then thought of day foster-care, which is *planned* temporary separation of an emotionally deprived child from his parents during the day in order to supply him with the emotional contacts he needs. For very young children the nursery can fulfil this purpose; at a later age, the nursery school; and for older children a day school for maladjusted children. The emotionally disturbed child from any family will benefit from these.

But it is not enough to remove the child from the stressful situation; if he is to develop a healthy personality he must have positive help. What is needed is not just nursery care but the use of nursery care in an organised therapeutic effort. During the separation the child is in a power-house of affection; the quality of care must be geared to supply the right ingredients for the emotional needs of the child deprived in his own home.

There are plenty of parallels for day foster-care. The *kibbutzim* system in Israel (Irvine 1952, Caplan 1953) is very similar in concept, and the results in the adolescent appear to be very satisfactory. The child is not cared

* Based on a contribution to the discussion at the Golden Jubilee Conference of the National Society of Children's Nurseries, 1956.

for by the mother in all communities: in some of them the care is given by the father (Mead 1935), in others by an older child (Mead and MacGregor 1951), and in others again by relations and friends (Leighton and Kluckhohn 1947). In our own culture the nanny had a very important rôle. Margaret Mead (1954) concludes in this context:

"At present, the specific biological situation of the continuing relationship of the child to its biological mother and its need for care by human beings are being hopelessly confused in the growing insistence that child and biological mother, or mother surrogate, must never be separated, that all separation even for a few days is inevitably damaging, and that if long enough it does irreversible damage. . . . Actually, anthropological evidence gives no support at present to the value of such an accentuation of the tie between mother and child. On the contrary, cross-cultural studies suggest that adjustment is most facilitated if the child is cared for by many warm, friendly people."

Day foster-care does not weaken parenthood. It must only function with the willing coöperation of the parent. It aims to support the parent and to strengthen parenthood by helping to produce children able in the future to be adequate parents.

Nursery Care as an Aspect of Day Foster-care

Day foster-care will succeed or fail in the nursery according to the quality of the staff; this is of overriding importance. The staff must be carefully selected for their ability to supply the warm mothering that the child needs. Many excellent and well-intentioned people are drawn to the care of the child because of empathy with the child as the result of their own unsatisfactory experiences as children. Unfortunately the emotional handicaps produced by these early experiences may make intimate work with the child unsatisfying and unrewarding both for the child and the worker. Warm happy relationship with their own parents and family in the past, and happy and harmonious relationships with other adults, including their relations, in the present, are essential qualifications for anyone undertaking intimate work with children.

Increasingly, women are going out to work; and there is a pool of potential workers in the mothers who have satisfactorily brought up their own families. The need for a masculine influence also should not be overlooked. We must mobilise our available stable population in areas, such as the nursery, where they can give greater help.

Of great importance in the organisation of a nursery is the handling of the parent. No worker must usurp the rôle of a parent; no friction must be allowed to develop. Parents must be welcomed and put at ease, and their contact with the nursery made as satisfying as for the child. A harmonious parent-worker relationship makes it possible for the nursery's influence to extend into the home.

Since the aim of the nursery is to meet his emotional needs, the child should be prepared for its régime: time must be spent in weaning him from his mother at his first visit. There must be enough workers to allow of nursing in small groups and of intimate contact between child and worker. The infant's only waking experience of adults, during its feeding, must be prolonged enough to give it emotional satisfaction and stimulation. Happiness must come even before cleanliness. Every point of organisation must be understood in emotional terms and have emotional value for the child.

It will be clear that this service by the local authority must become a free welfare service. It must be supplied freely and willingly by the community for its own self-improvement. On this expenditure there will be a rebate in money saved on approved schools, special boarding-schools, borstals, police investigation, and the like; and a great profit will be shown in the well-being of future generations.

References at foot of next column

RECURRING BED CRISIS

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IN reviewing the work of the London Emergency Bed Service Abercrombie [1] writes:

"Experience over the last few years has shown that fairly sudden increases in the demand for beds occur in January, February, or March. The exact timing, of course, varies from year to year, but their appearance seems inevitable."

The increased demand is mainly for medical admissions, especially of the elderly, and its chief causes are winter conditions and lack of help at home.

General hospitals serving an area find it impossible to accept all patients referred during the early months of each year. In accepting those who are acutely ill or whose social conditions are bad, they have to use beds intended for patients on their waiting-lists. These lists therefore grow longer, and remain abnormally long for two to three months after the winter crisis is over.

The figure shows the number of medical admissions over the age of 60 and the geriatric waiting-lists, for the first six months of 1956, at the City Hospital, Nottingham. This is an acute general hospital with an associated long-stay hospital (Sherwood Hospital). It has an acute geriatric medical unit and the general policy is to admit to these wards or the general medical wards all patients who might respond to active treatment, transferring to Sherwood Hospital those who must stay for a long time. In the first months of each year this policy cannot be maintained and direct admissions have to be made to Sherwood Hospital.

From Jan. 1 to June 30, the number of patients over the age of 60 admitted to the two hospitals was 1087—i.e., 62% of all medical admissions during the six months. Of these, 240 were admitted direct to Sherwood Hospital.

In the figure, emergency admissions are shown superimposed upon waiting-list cases. This does not give an entirely accurate impression, for many cases admitted from the waiting-list had assumed a quality of urgency during the period of waiting, and a second request had been received from the general practitioner. There was little difference in the acuteness of the cases whether termed "emergency" or "waiting-list" admissions. As Abercrombie remarks, very few were not in need of hospital treatment.

During the six months 167 names were removed from the waiting-lists for reasons other than admission. The reasons given were: improved since request, 27; refused admission when sent for, 26; entered local-authority part-III accommodation, 6; admitted to other hospitals, 13; died, 84; no reason given, 11. Many died within a few days of the initial request for admission; in some cases it was known that the patient was beyond any form of treatment and the request had been made only

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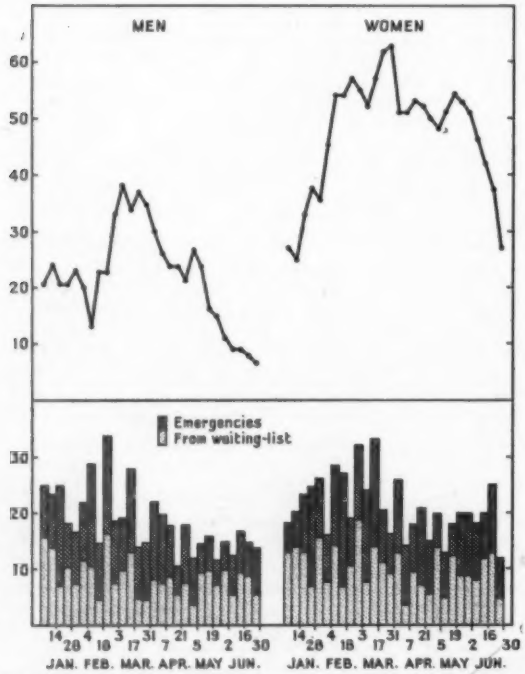
because of the insistence of relatives. Even so, there remained an alarmingly large number who died at home before they could secure a hospital bed.

The waiting-list for men was almost cleared by the end of May. For women, 30 names remained in June, though the ratio of long-stay beds was three female to one male.

DISCUSSION

The reluctance of general hospitals to admit elderly medical patients is not surprising. They fear that they will be left holding, not the baby, but the grandmother. A high proportion of those admitted die; of the remainder, some make a fairly rapid recovery and can be discharged, but a great many remain longer in hospital than their clinical condition necessitates because of unsuitable home conditions. They live alone, and during the winter they cannot be discharged quickly back to their own homes. At present the official attitude appears to be that this annual "epidemic" of geriatric medical patients presents an insuperable problem. Possibly there is no complete answer but surely something could be done.

Abercrombie suggests that more beds should be made available for medical emergencies during the first three months of the year. This could only be done at the expense of beds in other specialties; and as in most areas there already are large waiting-lists for surgical cases, this solution will not receive general approval. If other accommodation could be found for the patients needing a period of institutional aftercare at the end of the acute phase of their illness, the turnover in general hospitals would be considerably greater. Any accommodation providing warmth, good food, and friendly care for another month or so would suffice. Might it not be possible to reserve beds for this type of patient in recovery hospitals, in convalescent homes in suitable areas, and possibly in infectious-diseases hospitals or even sanatoria?



Geriatric waiting-lists, and medical admissions over the age of 60 (Jan.–June, 1956). Upper portion: waiting-lists (weekly average of daily number). Lower portion: number of admissions (weekly averages).

Supplementation of home services—particularly home nursing and home help—might make it possible to care for many more at home. Unfortunately, all services, hospital and local authority, are depleted through illness during the first months of each year; but perhaps temporary workers could be employed, or voluntary helpers enlisted, to augment the existing personnel.

If a widespread epidemic of influenza occurs, crisis measures will be needed. It would be wise to prepare before the crisis occurs.

SUMMARY

Recently figures were given for the London Emergency Bed Service showing the greater demand for hospital care for the period January to March. Comparable figures are now shown for a provincial hospital.

Because of the number of emergency medical admissions of elderly people, geriatric waiting-lists grew, especially the list for women.

Many patients admitted in the early months from the waiting-list were found to be as acutely ill as most emergency admissions.

167 names were removed from the waiting-lists for reasons other than admission; of these, 84 had died at home.

If home services for the elderly sick were expanded, more could be nursed at home. If, after a period of treatment, general hospitals were able to discharge some of their elderly patients to beds in auxiliary hospitals, they would be better able to meet the demands made on them, and their waiting-lists would not have to increase each winter. Often discharge has to be delayed, not through the need for continued treatment, but because of the bad conditions in the patient's home.

I am grateful to my colleagues for permission to include numbers of patients admitted to their wards, and to Miss J. M. Mills who charted the daily count.

SAFETY AT WORK

A GRAPH in the annual report [1] of the Chief Inspector of Factories, Sir George Barnett, shows that, after a steep rise in the early years of the late war, the number of fatal accidents in factories has fallen fairly steadily (it is now about a tenth of the number of accidents in the home), but since 1952 there has been a slow steady rise in the number of non-fatal accidents. The rise, however, has been proportionately less than the increase in the factory population, and the total accident-rate was the lowest yet recorded. This year, according to a new system, it is expressed in the form of an index number (89·2), the rate for 1950 being taken as 100. A high proportion of accidents involve women and young people who are new to the factories, and Sir George emphasises that factories should take special care to instruct them. The many other recommendations include one that those who wear safety boots should have two pairs, for many accidents happen while the safety boots are being repaired.

Among the increasing risks is that due to ionising radiation (19 samples of radio-isotopes were supplied to U.K. industry in 1948, and 1450 in 1955), but this seems to have caused few ill effects. Routine blood-counts have shown leucocytosis or the presence of primitive cells in occasional workers with radio-isotopes. The Radiological Protection Service was recently constituted and is run by the Ministry of Health and the Medical Research Council. It is now responsible for

1. Annual Report of the Chief Inspector of Factories for the Year 1955. H.M. Stationery Office, 1956. Pp. 275. 9s.

the film-badge service, which has shown a steady reduction through the years in the number of workers exposed to more than the maximum permissible dose of radiation—i.e., 0·5r weekly. The recommendations of the International Commission on Radiological Protection were published this year.

That some of the old hazards persist is shown by the recording of 211 cases of epitheliomatous ulceration, with 18 deaths. 163 were due to pitch and tar, and 48 (with 9 deaths) to mineral oil, mostly in cotton-spinners. There were 261 cases of chrome ulceration and 69 of lead poisoning, but none of these were fatal. One disturbing feature is that the total number of cases of poisoning is slightly higher than it was last year.

HOSPITAL COSTS

DETAILED costing returns for the year ended March 31, 1956, covering some 2500 hospitals in the National Health Service in England and Wales, were published earlier this month.[1] Three main sets of figures are presented: (i) the total inclusive net cost per week per patient; (ii) the same cost after allowing for outpatient expenditure (this is done by assuming that for costing purposes five outpatient attendances equal one inpatient day); and (iii) the cost per case (but this is not calculated for hospitals where patients remain for long periods).

The figures do not, of course, allow for changes in the value of money. Hence, if comparisons are to be made between one *year* and another (as opposed to inter-hospital comparisons), some adjustment is necessary to make the figures comparable in terms of real cost. It is not possible to calculate a precise index of the value of money for this purpose, without enormous labour and many assumptions; but by taking as an index the "purchasing-power of the £," a truer comparison is possible. When the costing figures are adjusted in this way (as in the accompanying table, which does not include teaching hospitals) year-to-year comparisons fall into two groups—1950–54 inclusive and 1954–55—the reason being that the basis of the classification of hospitals was changed from April 1, 1954, onwards. The figures in italics in the table show the changes in the weighted figures during 1951–54 and 1955–56, taking the first year in each period as 100; the comparative stability of these costs is remarkable.

GENERAL HOSPITALS ADMINISTERED BY REGIONAL HOSPITAL BOARDS AND HOSPITAL MANAGEMENT COMMITTEES

—	Year ended March 31					
	1951	1952	1953	1954	1955	1956
(*a*) Total inclusive net cost per week per patient (crude figures) ..	£ s. d. 13 10 3	£ s. d. 14 5 11	£ s. d. 15 4 9	£ s. d. 15 15 5	£ s. d. 16 9 0	£ s. d. 17 15 0
(*b*) Index of relative purchasing power of £(1938 = 100)	48	45	42	41	41	39
(*c*) Weighted figures of net cost .. (*a* × *b*) ..	649 (*100*)	643 (*99*)	640 (*99*)	646 (*100*)	674 (*100*)	692 (*103*)

The basis of classification of hospitals was changed at April 1, 1954, so that 1951–54 figures are not comparable with those for 1955 and 1956.

1. National Health Service: Hospital Costing Returns for the year ended March 31, 1956. H.M. Stationery Office, 1956. Pp. 137. 20*s*.

Personal Papers

A SPASTIC PARALYSIS

SPASTICITY varies so greatly in its type, distribution, and severity that a general picture is hardly possible. In my case it is limited to the lower limbs, bladder, and back, and is due to a spinal lesion in the lower dorsal region which I acquired in middle age.[1]

As I lie in bed on awaking I feel to be perfectly healthy and natural, except perhaps for a very slight stiffness in the lower part of my back. The muscles of my legs are soft and relaxed. But as soon as I uncross my legs, I become aware of their weakness: the leg cannot lift the bedclothes, and I trail the upper over the lower leg. Then I find I am absolutely unable to raise my body. I have to use both arms to raise myself, and have to be supported on pillows because I cannot continue to sit up by my own muscular effort. The reason for this is of interest. After paralysis due to a "cerebral accident" recovery occurs from above downwards, so that the patient may be able to stand and move his limb whilst still unable to dorsiflex and control his foot; but in my spinal lesion recovery began in the toes and slowly moved up the limb. The iliopsoas muscle was therefore the last to recover, and it was inaccessible to massage. Its recovery was therefore very imperfect, and, as it is the powerful flexor of the thigh upon the abdomen, my ability to raise myself in bed or to lift my leg going upstairs is seriously impaired.

To get out of bed, I lift the bedclothes off my enfeebled limbs, and lift my legs over the side of the bed with the aid of the arms, and with my arms push myself erect. The moment I stand I am conscious of instability and I use my arms to help my balance. Up to this point I feel as if I could walk briskly, but as soon as I try to do so I find that the voluntary impulse is feebly transmitted and my leg movements are slow and weak. My knees bend and unbend stiffly. The three elements—weakness, stiffness, and instability—together constitute my motor defect:

The instability is not due to injury or disease of my posterior columns: these are unimpaired and I can, with care, balance myself standing on either leg. It is due partly to a selective weakening of the muscles (the right anterior tibial, for example, are particularly weak) but more especially to the slow action of the muscles, so that if I sway or am pushed aside, I find it hard to regain my balance. I seldom fall, however, though friends are often alarmed lest I should, and put out an arm to support me. The reason is that I can just get enough power into my limbs to recover myself. I know at once if I will be unable to do this, and have just time enough to arrange how I fall and to provide against injury. This is a special art, and one day, tripping over a rug, I fell so gracefully that the spectators did not come to help me up (a very unusual thing) as they thought I had done it on purpose for demonstration.

I interpret my own spasticity as follows. When a healthy person moves a limb, the muscle causing the movement contracts, and the opposing muscle relaxes. In my case the relaxing mechanism has gone, and part of the active contractile impulse passes into the opposing muscles. Hence the resultant movement is weakened and slowed. The spasticity is not present until the voluntary impulse brings it into action.

* * *

The behaviour of my urinary bladder forms an interesting contrasting study. Although the normal person has considerable control over the action of the bladder,

1. Disabilities and How to Live with Them. London, 1952; p. 114. (Published by The Lancet Ltd, 7, Adam Street, Adelphi, London, W.C.2. 10*s*. 6*d*.: Postage 10*d*.)

I now possess none—my bladder is so small that I have no control over it. In the strict sense, I never pass water: my bladder passes water on my behalf, when and how and where it pleases.[2] All voluntary impulse is excluded. The normal sensation giving rise to the desire to micturate is absent, and I am unaware in advance that micturition is about to take place, excepting in one peculiar instance. If I am walking and my already slow pace suddenly falls off, I know that very soon—perhaps in twenty seconds—my bladder will declare its intention to act, and will act. Human beings and animals (except the birds) do not move during the acts of excretion, and I prefer to stand still during micturition, although fortunately (as it is not always convenient to stop) I can reinforce the impulse to move and continue to walk as before. Whether the mechanism of walking and micturition are mutually inhibitory, or my lumbar centre is unequal to carrying both at the same time, I do not know.

The sensation that micturition is imminent and inevitable I sometimes have, often I do not. It has been shown that this sensation originates in the urethra, not in the bladder. I feel it deep in the pelvis, at the neck of the bladder, as if (I imagine) a bougie were dilating a stricture. It is in fact the dilating of the spastic neck of the bladder to allow the urine to pass. On the single occasion when I had a cystoscopic examination, the skilled operator, after he had with difficulty passed the instrument through the neck of the bladder, said with an air of satisfaction "It is as I thought, there is no paralysis but a spasm of the bladder-neck," I deduced from these experiences that this spasm is always present, and that it does not (as in the legs) come on temporarily as a diverted nervous impulse when the bladder contracts. It may be noted that dilatation of the urethra by blowing it up with water or air or by the passage of running water through the urethra do not excite contraction of the bladder,[3] and therefore one is justified in assuming that the passages of the cystoscope did not cause the contraction of the bladder neck.

* * *

It appears to me that the mechanism of the spasm in the bladder and in the limbs is, in my case, essentially different: the actual spasm of the bladder neck is continuous, that of the limbs intermittent.

The muscles of the lower part of my back are also spastic and slow of movement, whether bending or rotatory. The one advantage of this is that one can stand erect far longer than the ordinary person without fatigue.

* * *

The above disabilities have two effects on life—physical and psychological.

The physical disability literally dogs one's footsteps and regulates every movement. To deal with it adequately requires a long, detailed, careful, and persevering education, but it is richly rewarded. Each year the patient should progress. I am astonished to find I fall so much less often and less harmfully. One learns instinctively to watch every cause of mischief and to avoid it, and to take advantage, without self-consciousness, of every artificial aid (the stick, the old man's rail) that present-day knowledge can give.

Psychologically, spastics (and paralytics) are brave and optimistic people, and given proper guidance will work untiringly in the effort to return to normal. I have never once thought it impossible that I should get well, and I should not be surprised if tomorrow I found that I could walk properly and run again. But I see spastics so severely affected as to excite all one's sympathy, such as the man who hops about the park on rigid stilt-like legs, steadied by the arm of a companion.

Most to be pitied are the spastic children, whose spasticity arises from the brain. But often far more can be done for them than one would think. In our ward is a little girl about 4. The energetic chairman of our new spastics home looks at her and shakes hands with her. She smiles and tries to talk. He says "that child can be developed. She is striving to express herself. By hook or by crook I shall get her into our new home and we shall make something of her." His faith may well be justified, for it is stated of congenital spastic paralysis: "There is, perhaps, no disease which demands greater patience and persistency in carrying out of suitable treatment, and there are few diseases in which more brilliant results may be produced from apparently hopeless cases by pertinacity in treatment."[4]

X.Y.Z.

2. The methods used to cope with this incontinence have been described in a previous paper (*Lancet*, July 7, 1956, p. 35).
3. Nathan, P. N. *Brit. J. Urol.* July, 1956. p. 127.

The Widdicombe File

XXXVII. MORTUARY PORTER

DEAR ROBERT,

So the mortuary porter at your hospital has been caught stealing the absolute alcohol to make Red Biddy, has he? How deplorable. And he was using the body refrigerator as a place of concealment for his illicit stocks, was he? That puts him beyond the pale. To drink the departmental absolute is bad enough, to sell it worse, but to use the mortuary for so secular a purpose is very nearly sacrilege.

It is, seriously enough, a sad business. He will be sacked and may be gaoled. Good riddance to a rogue, you will say. Perhaps you're right. But I've a good deal of sympathy for him. There are some anomalous and unsatisfactory things about the position of mortuary porters everywhere. May I have your ear for a while on the subject? It's a grisly one, perhaps, but only the parasites of our profession can afford always to withdraw the hem of their white coats all the time from a bad smell.

When we were young together, Robert, a century or two ago, and were housemen at the Redbrick Royal, we owned in common—do you remember?—a key to the Back Gate. Memories, eh?—but Night Sister must long be in her grave, and our partners night sisters or very matrons in their turn, or mothers of six perhaps. To us in our frolic youth the Back Gate meant nothing else; but it had more sinister uses. A hearse at the front gate to greet the entering patient or his visiting friends is anathema: they must exit discreetly at the rear.

It is right and proper that it should be so. Statistically, we know six or seven hundred of our patients must die each year. It is inevitable. They all go into the dark,

> The captains, merchant bankers, eminent men of letters.
> Distinguished civil servants, chairmen of many committees . . .

not to mention the old-age pensioners, housewives, and general labourers. But whatever we know statistically, it must always be assumed at the Front Gate that everyone goes out by that same gate wherein he went, that death is something that doesn't happen to real people, that the Back Gate does not exist. It is a necessary optimism; it is part of the treatment. But the Back Gate and its mortuary suffer under the conspiracy of silence. It must be neither seen, nor heard, nor thought of.

It's not that it's no-one's responsibility. Both the administration and the pathologist are concerned, and

4. Price's Textbook of Medicine. London, 1946.

they should make a formidable team. But the administrator is affected by the conspiracy of silence, and in any case a hospital administrator who was interested in mortuaries would almost certainly be the last sort of man to have in charge of a hospital. In practice it devolves largely if often only semi-officially on the pathologist, who tends by training to take a somewhat casual view of corpses, who sees undertakers chiefly from their seedily commercial underside, and is apt to take the whole affair seriously only in its pathological aspects. So long as post mortems go smoothly and the place is reasonably clean and decent, he usually takes the rest for granted. I do so myself, I'm afraid, most of the time.

In all but the longest of long runs, it all boils down to one man, the mortuary porter. Now of mortuary porters there exists a very well-established stereotype, compounded of Caliban, the brothel-keeper in Pericles, Sweeney Todd, and the purest horror-comic flimflam. Halt, ugly, old, illiterate, intemperate, relishing meat pies and beer spread on a newly cleared slab, he is, with his saw, his hose, his grumbles, and his graveyard jokes, a walking Grand Guignol treat to the medical student and to the less fastidious writers of medical student novels. There, you will say, goes a Character.! It is partly true of course: some mortuary porters are a little like that, and many more try to live up to what is expected of them. It is significant that the only one I ever met who seemed at all typical was the one we knew as students at Redbrick, and called the Friar (he died soon after—did you know?—of a coronary as he was lifting a body alone in his mortuary, and the two were found hours later sprawled together on the floor—Grand Guignol if you like!). The men of that calling I've known since I've known better, and I've found them various and mostly good, but none like their traditional portrait.

It is, you know, Robert, a difficult job. Consider all the things we ask of Mr. Q., our present incumbent. Leave aside the absence of squeamishness: one assumes that only strong stomachs will apply for the job. It can be exceedingly hard work: try manœuvring a 17-stone body solo, if you doubt that, Robert. It is, however, sporadic work. He does not often sit down during daylight in foggy Februaries: he must avoid either boredom or well-meant attempts to fill his time with irrelevant tasks in August. He faces a high occupational morbidity. It is skilled work, needing considerable rough-and-ready anatomy and elements of half a dozen trades. (Mr. Q. happens to be an artist in the art whereby

> "Imperial Caesar, dead and turned to clay
> Is pickled in pots to tease on viva day.")

He needs to be obsessional about cleanliness if the place is to be kept habitable, and about records if the most fearful gaffes are to be avoided. He has to deal tactfully with three quite different kinds of people—relatives, who ask decorum and sympathy: undertakers, who expect businesslike efficiency, and sometimes need diplomacy and firmness; and pathologists, who need diplomacy and firmness also at times, but will not be satisfied with their assistant if he cannot once in a while capture a spark of the prevailing enthusiasm when a big case is breaking.

A paragon, you will say? Our Mr. Q. is most of it. So have been a few others I have known. And so of course have some not. The surprising thing is that anyone even remotely good enough for the job ever looks at it.

Do you know what the basic wage of a mortuary attendant is? Exactly that of a run-of-the-corridors porter—rather less than a bus-conductor's—something in the £6–7 a week range. When you consider the intellectual attainments of the average hospital porter, it makes you think, doesn't it? (I don't mean head porters—they need and often have skills of their own, but they get paid accordingly, or more accordingly than Mr. Q. does, anyhow.) But wait a moment. Remember I said basic.

Two things make the job attractive. For one thing it's relatively a one-man show. Our Mr. Q. is too able a craftsman to tolerate direction by a foreman, but yet not of the stuff that gets over that by becoming a foreman himself. To such a man a solo job like this provides the needed niche. The other attraction, sad to say, is the pickings. For the truth of the matter is that our Mr. Q. gets more than a little above his basic wage. First of all, he has an official 3*s*. a post mortem. That's something, but not much—another 30*s*. a week at most over the year. Then he gets, traditionally but not officially, the odd shilling in each guinea of fee when his pathologist does a coroner's P.M. or anything of that sort. And odd men and odd departments with odd research projects or teaching commitments may need his help and pay him something quite unofficially for it. But more important, probably, are the undertakers. He can help or hinder them considerably in various ways: they hold, it is true, in return considerable powers to hinder or help him (and me) if they wish: but on balance they are believed to find it convenient to mollify his formalin-tanned palm with a little cedarwood oil at times.

How much it all adds up to probably even Mr. Q. would have difficulty in saying. Year in and year out, I've little doubt its a modest enough total. He's better off than most hospital porters, and that's as far as anyone dare certify. And what's the harm you will say? The labourer is worthy of his hire, even if it reaches him somewhat irregularly. Justice is done.

The trouble is that, as justice is not seen to be done (I know I'm perverting the phrase), no-one can check on its being just. Mr. Q. acquires his justice by divers semi-official or totally non-official means, most of them depending a good deal on his own initiative. He is honest, discreet, and if covetous long-sighted in his covetousness. The system works in his case—as in most cases. But it's not surprising that sometimes it doesn't. It amounts to this. We put a man in a post requiring considerable resources of hardihood, strength, skill, and tact, and difficult to supervise closely, and we pay him the least wage we can pretend is a wage at all. We count on getting a good man because we know the lack of supervision and the pickings make it attractive. Then if the man gets into trouble through trying to enlarge the pickings illegitimately we lift our hands in pious dismay and babble of Burke and Hare. Burke and Hare were monsters, I grant you—but, Dr. Knox, whatever the rights and wrongs of the individual case, were you wholly guiltless of the system that made them possible?

I've presented one side of the story only. In extenuation, I would plead that we are trying various ways to straighten out Mr. Q's position. It's a stickier problem than it looks. For one thing, being an individualist, he won't be reconstructed and he don't give a damn. For another, the trade-union aspects are of a singular and unhelpful convolutedness. But that, O Best Beloved, is another story. I hope at least you will agree something might well bear doing about it. "No man is an island, entire of himself" and we are none of us wholly free of complicity in the sins of our subordinates, even in this slightly bizarre direction.

Yours,

PETER DAVEY.

In England Now

A Running Commentary by Peripatetic Correspondents

FOR some time the temperature in our house has been a function of the temperature of the outside air. Unfortunately, central heating and double windows are rather beyond our means, but slow-burning stoves, metal strip on the doors, rubber draught-protectors, and sticky brown paper for the windows gave me at least the feeling that I was doing something about it. Recently, however, my wife, who is in the habit of reading advertisements, announced that the trouble with our house was the roof, which was not properly insulated and was allowing the heat to go upwards instead of reflecting it back into the house. Fibre-glass was required to lay between the rafters—"Just the sort of job you're good at, dear."

It was not long before I was up in the roof scrambling about in dirt and darkness. Unfortunately, my education, which included a large number of "don'ts" and "nevers," had nothing whatever to say about roofs, and no-one had troubled to tell me what would happen if I stepped between the rafters. It didn't take long to find out. The children, playing quietly in the nursery in the belief that daddy was mending the roof, were startled when daddy's foot suddenly projected through the ceiling followed by clouds of plaster and dust. Oddly enough, my wife, who has second sight in these matters, had chosen just that time to go out shopping, so it took some time to clear up the mess. Two hours later I was up aloft once more, on the principle of the man who drives his car away from the scene of the accident, and I stayed aloft most of the week-end.

I have to confess that after a while I began to get a certain grim satisfaction from the work. Perhaps I felt I was helping to make this a better roof where spiders of the future would be proud to bring up their families; or perhaps it was the knowledge that I intended to finish this job however futile it might prove to be. And finish it I did, and the house feels warmer to me. Visitors, too, keep remarking on how warm it is in our house, but I am a little suspicious of their praise since I saw what I think were knowing glances pass between two visitors and my wife.

* * *

I wish I knew whether it is progress in pharmacology or just a sign of the times. In the 'thirties, when I was a registrar, the sample post was composed almost entirely of headache tablets, and welcome they were. Some years ago they were replaced by sedatives, but last night, looking for a soporific, I could find nothing but modified stimulants—mixtures of something like amphetamine with something like barbiturate. There are signs too of the thin end of the wedge of "tranquillisers," but in middle age I do not need a tranquilliser, I need a sedative at night when my sins come home to roost and a headache powder for the next meeting of the medical committee.

* * *

As we stood on the stairs, in alphabetical order, outside the library at the Royal College of Physicians, it occurred to me that something odd had happened to my position in the queue. My clinical examination, like my name in the telephone-book, was about midway between the beginning and the end. At the pathology and final vivas I was placed later. Now, in the final stage, there were about three times as many before me as after. There seemed little doubt that the phenomenon was statistically significant.

Since then I have discovered that the medical profession can be divided into four almost equal groups, the A to D's (559 pages in the 1954 *Medical Directory*), the E to K's (559 pages), the L to Q's (560 pages), and the R to Z's (587 pages). In the years 1952–55 inclusive, these groups contributed 152, 149, 114, and 162 new M.R.C.P.s respectively, and the departure from the distribution expected if there were no bias according to initial letter is significant (P approx. 0·05). What is more, there are clear differences in the pattern from year to year, the 1952–53 sequence being 74, 77, 43, 91, and the 1954–55 sequence 78, 72, 71, 71, (P less than 0·025).

The alphabetical arrangements at the clinical examinations and at the pathology viva should plainly be abandoned in favour of a random order. Justice must seem to be done.

* * *

It is the night of the Dismembership Ball and everyone is gay—everyone, that is, but the General Physician, who sits grasping the upper-respiratory catarrh and the dyspepsia, casting anxious glances to right and to left like a dog fearful that his bone may be taken from him. On either side of his dais, like the supporters of a coat-of-arms, stand Youth and Old Age, half turned away as though to accentuate his isolation.

The General Physician is sad and full of foreboding. The ritual dance of Healing has begun. At his command, and with his invocation of the blessings of his honoured forerunners, who made Medicine great and himself the greatest in it, the figure of a man was borne before him, the embodiment of suffering Mankind. The dancers followed, swaying together in a strange rhythm possessed with the fervour he inspired. The swaying quickened, like a strong wind over a field of corn, till there was no peace in the great hall. Mankind was swept into their dance, submerged in a flood of enthusiasm till the General Physician could see him no more amid the joyous, ecstatic dancers. He leapt from his throne—to the rescue.

The climax passes, the rhythm slows, and restful peace returns, the music hushed. The dancers pause and the General Physician sits, grasping like the symbols of Aesculapius the upper-respiratory catarrh and the dyspepsia. Youth and Old Age withdraw a little further. Babinski ponders contentedly over the putamen while Venus smilingly turns away. Ziehl-Neelsen embraces the whole thorax but laughs merrily as Mitral steals away his heart. Cutis lovingly strokes the skin while casting cynical, but friendly, looks at Calcis, earnestly counting up the bones in spite of Erythron who claims their centres for his beakers, already red to overflowing. Allergy and Hypophysis gaily toss for the collagen with Rheum's two-headed penny, and Death, the general surgeon, slowly sharpens his blade on his bacteriostatic coat tail. Langerhans looks doubtful but falls in step with Science as he leaves the dais and wanders benignly down the hall. Psyche burnishes the halo oblivious of the wranglings of Febrilis and Agar as to how the serum should be divided.

The General Physician rises from his throne and speaks: "My children what have you done to Mankind, what have you done to me? I am to heal Mankind, you have destroyed him." But the music drowns his words, the dancers rush again into the dance, the rhythm snatches up their cry:

> "He is too complex for you
> We know him better bit by bit
> He is too complex for you."

A lonely figure stands, his words unheeded, "Let us but have him first, lest we forget, lest we forget. . . ."

* * *

The Professor was hailed by a cheerful voice "Good morning, Professor, do you remember me?" Now this Professor never, never forgets a face. The patient was adamant that the Professor had treated him some eight years back. The Professor was equally adamant that the patient must be mistaken as he would certainly have remembered him. On hearing that the patient was in hospital because of peripheral neuritis the Professor mused—"peripheral neuritis and altered facial appearance"—then he turned to his registrar and asked him to have a smear done for Hansen's bacillus. Sure enough in due course back came the report confirming the diagnosis of leprosy.

* * *

The diagnostic equipment that doctors carry round with them is an engaging study. Not long ago I was in consultation with a very senior practitioner who inspected my electrocardiograph with interest, and told me that in his younger days he used to take Mackenzie's polygraph with him in his carriage. Now I see that two of my colleagues (*Lancet*, Nov. 17, p. 1026) seem to be contemplating the regular use of a bedside centrifuge.

* * *

> To patients with the humble heddick
> I trust I'm duly sympatheddic,
> But those pronouncing it "my-graine"
> Go very much against my grain.

Letters to the Editor

THE FUTURE OF NURSING

SIR,—The statement of policy from the Royal College of Nursing, which you referred to on Nov. 24, must revive many doubts in the minds of hospital doctors. One must sympathise with the council of the college in that they are apparently expected to provide a service for their members which is comparable to the combined activities of the Royal College of Physicians, the British Medical Association, and the Medical Defence Unions. Naturally they are expected to improve the status of their profession vis-à-vis the doctors; but this leads to an unfortunate tendency to build up a parallel team, the members of which communicate with the doctors only through carefully delineated channels. Thus in the statement from the college, the hospital doctor is never mentioned, and we read (p. 5):

> "Liaison is of the utmost importance. The continuous and total care of the patient is ensured through contact between ward sister, district nurse, health visitor and occupational health nurse."

The Royal College of Nursing wish to raise the status of nurses still higher, but there is much to be said for the opposite view. Many feel that training in nursing methods should become an accepted part of the national endeavour to educate women: the only way this can be done is to accept girls for training when they leave school, but this will not be successful unless these girls are given full status as nurses in training, within six months of starting their course. It is unrealistic to expect them to be content to remain cadets for longer, nor can one expect large numbers of women to change their occupation at the age of 18. Most modern girls are quite able to face up to hospital work at the age of 17.

The other change which would be advantageous in the national interest would be to downgrade the level of training of the State-registered nurse (S.R.N.), and to make the assistant-nurse training course become the national standard. All higher forms of nursing study would then be connected with postgraduate qualifications. This would raise the status of the present assistant nurse in training, who at the moment is not even allowed to work in the same ward as an S.R.N. in training. It would also provide the all-important opportunity for the present assistant nurse to reach the higher ranks of the profession, which is at the moment almost impossible. Surely these or other changes towards democracy are more pressing than the proposals to establish F.R.C.N.s, and university degrees in nursing.

Oxford. W. RITCHIE RUSSELL.

X RAYS AND LEUKÆMIA

SIR,—Many a diagnostic radiologist must have felt disconcerted and confused when the results of the investigation by Dr. Stewart and her colleagues on the incidence of leukæmia after intra-uterine irradiation of the fœtus for diagnostic purposes were published in your issue of Sept. 1. For weeks I have waited for an authoritative statement by a radiologist with experience in pregnancy radiology, either to challenge or to support the findings of Dr. Stewart, but no-one with knowledge on the subject has so far touched upon the crux of this matter which, if accepted by radiologists, would necessitate a complete review of the normal workings of X-ray departments and would force us to refuse numerous requests for all types of examinations, with consequent detriment to diagnosis of disease in general.

Dr. Stewart appears to have deduced from a statistical analysis carried out on 538 patients that a diagnostic dose of radiation of 1–2·5r given on one particular occasion to a fœtus can have such far-reaching consequences in the distant future as to cause leukæmia or other malignant disease. Therefore, I feel that before we consider imposing any limitations on the scope of diagnostic radiology we should clearly sift and analyse all available evidence.

(1) There is irrefutable evidence that leukæmia may be caused by large therapeutic doses of X radiation in human beings as well as in animals. Cases of leukæmia have been reported in radiologists and in nurses working in X-ray departments before the days of protection and it is a well-established fact that in their ignorance of possible consequences the bodies of these X-ray workers were exposed to many hundred röntgens during decades of work in old-fashioned departments.

(2) In a more recent observation a statistically significant increase in leukæmia was found in those patients with ankylosing spondylitis who had received radiation treatment compared with those who had not been treated at all. The M.R.C. investigators found that 49 patients out of 30,000 treated developed leukæmia, and in those of whom any details of treatment were known it was found that 35 had received dosages between 500 and 3000r, while 2 received doses of less than 500r. It is obvious that those receiving treatment of less than 500r probably were exposed to a radiation dose in the neighbourhood of 400r, but not to 1r as normally given in a diagnostic pregnancy examination.[1]

(3) Among the facts most frequently quoted in support of the view that leukæmia develops after irradiation are the results of the atomic-bomb explosions at Hiroshima and Nagasaki. But there 205 pregnant women were exposed to doses of radiation so severe that in 101 cases they caused burns, radiation injury, epilation, purpura, fever, or gastro-intestinal bleeding. Yet none of the surviving offspring of any of these women developed leukæmia in spite of being exposed to doses of up to 1500r.[2]

(4) The incidence of leukæmia in children in Hiroshima within 1500 metres from the hypocentre (the point above which the atomic bomb was exploded) was thirty times that of the more distant group. In spite of some definite radiation, variously estimated at between 5 and 200r, which existed beyond 1500 metres, the incidence of leukæmia in children at this distance was within normal limits and showed no increase in spite of many thousands of children being exposed.[3]

(5) Taking the combined figures of Hiroshima and Nagasaki, it has been estimated that within 2000 metres from the hypocentre 39,000 people were exposed to the full effects of the bombs. Among these there were 65 cases of leukæmia. These people were also suffering from severe radiation burns and very severe radiation sickness. Beyond 2000 metres there were 155,000 people and among these only 10 cases of leukæmia were detected. This latter figure is within normal limits for the leukæmia incidence in Japan. There were, however, very many of these people suffering from mild radiation sickness indicating that even at this much greater distance doses of up to 100 or even 200r must have been received. Yet in spite of the comparatively heavy exposure which was received by this vast number of people, no increase in the incidence of leukæmia could be observed. This suggests that radiation has to be of an order of more than 100r or even 200r before it can produce malignant disease and that it seems to be quite harmless in small doses.[4–6]

1. Court Brown, W. M., Doll, R. *In* M.R.C. Report on the Hazards to Man of Nuclear and Allied Radiations. H.M. Stationery Office, 1956; p. 87.
2. Plummer, G. *Pediatrics*, 1952, **10**, 687.
3. Miller, R. W. *Ibid*, 1956, **18**, 1.
4. Folley, J. H., Borges, W., Yamawaki, T. *Amer. J. Med.* 1952, **13**, 311.
5. Lange, R. D., Moloney, W. C., Yamawaki, T. *Blood*, 1954, **9**, 574; *Ibid*, p. 663.
6. Moloney, W. C., Kastenbaum, M. *Science*, 1955, **121**, 308.

(6) X-ray treatment for thymic enlargement in infancy is held to be responsible for leukæmia. In a large American series, the great majority of children received total doses varying from 50 to 1500r and some even over 3000r. The great majority were given doses of under 600r but at kVs ranging from 110 to 220, which is $1^1/_2$–3 times the voltage used in diagnostic pregnancy work. Among a group of 604 children who received 200r or less there were 3 cases of leukæmia, but no accurate information about the exact dose is available. It could not have been a minimal dose, however, as the smallest dose administered was fifty times that of an ordinary pregnancy exposure.[7]

(7) In experiments with mice exposed to controlled intensity of radiation, dosages of less than 192r were associated with an even higher incidence of leukæmia in the control group than in the irradiated group.[8] Rats irradiated at 250 kV required numerous treatments with total dosages between 112 and 484r in order to produce leukæmia in a very small number of the exposed animals. 2 dogs out of 109 developed leukæmia after doses of 2540 and 2956r respectively. It would, therefore, be most surprising if human beings should be so sensitive in their response to radiation that leukæmia developed after a dose many hundred times smaller than that required to produce the disease in other mammals.[9 10]

(8) My own experience in diagnostic irradiation of pregnant women is largely based on the figures of Shrodells Hospital, Watford, to which all cases from the local maternity hospital have been referred since 1940. The X-ray department also catered for some antenatal clinics and for general practitioners who might refer their own patients for pregnancy films. The total number of pregnancy examinations carried out in 16 years from 1940 to 1955 exceeds 4000. About a third to half of these examinations were pelvimetries. In these, a radiation dose of about 2·5r was probably received by the fœtus. With the coöperation of the local Registrar of Births and Deaths I have been able to obtain the names and addresses of all children under 6 who had died from leukæmia during the past fifteen years. Altogether, 6 children have died from the disease but none of these children's mothers had had a pregnancy X-ray examination.

I have, therefore, attempted to analyse the figures given by Dr. Stewart, and on the basis of my own experience I believe that her investigation does not take into adequate consideration the fact that a pregnancy X-ray examination is not a routine examination. Such a radiological examination is confined to a highly selected group of mothers whose doctor is dissatisfied or worried about certain features of the pregnancy, in which he detects or suspects a deviation from normal. Such an examination is therefore carried out in comparatively few cases. For example, a mother suffering from heart-disease or tuberculosis is much more likely to have an X-ray examination, because the obstetrician wants to ensure that she will not have a difficult or prolonged labour. A mother with a history of rickets, Pott's disease, ankylosing spondylitis, poliomyelitis, or even osteochondritis of the hips may be sent for an X-ray examination of her pelvis to discover a possible contraction before delivery. Diabetes in the parents will make the doctor in charge of the delivery wary and he will want to be reassured about the size of the baby. Toxæmia of pregnancy is another reason for X-ray examination to ascertain fœtal size and age in order to make certain that a medical or surgical induction can be carried out with safety. Obstetric radiology is undertaken much more often in women of small stature, who may have hormonal dysfunction, to exclude the possibility of a small pelvis with a baby of normal size.

Probably one of the most common reasons for an X-ray examination is the inability of the obstetrician to feel fœtal parts properly because there is more liquor than normal. It is quite possible that in most of these cases of mild hydramnios, where no fœtal deformity or abnormality is found radiologically or even at birth, there is already some deviation from the normal in the physiological build-up of the fœtus which may later lead to leukæmia.

Correlation between sets of survey children and controls would, in my opinion, be justifiable only if their selection and composition took into account similar maternal and fœtal abnormalities that have prompted the doctor to refer the case for an X-ray examination in both groups.

I think there may be a reversal of cause and effect in the whole of this argument that diagnostic X radiation is responsible for leukæmia. It seems much more likely that there is some inherent abnormality or morbidity in the mother or fœtus which predisposes to the later development of leukæmia. The figures given by Dr. Stewart herself are already pointing to such a trend. A comparison between the number of X-ray examinations on babies during pregnancy shows that 18 more were carried out in the leukæmia group (42 against 24) than in the control group. It seems equally significant that X-ray examinations of leukæmia mothers before the conception of the survey child (as far as non-abdominal parts of the body were concerned) exceeded by 15 (103 against 88) those of the normal control group. This suggests to me that there is already evidence of some disease in the mother which may predispose to leukæmia in the offspring.

For these reasons I do not feel that radiologists should be stampeded into any drastic curtailment of their work, because there is no actual proof whatever that a diagnostic dose of X rays on a single occasion to a fœtus can cause the effects which have been ascribed to it. It seems most desirable that we come to regard X rays in the same way as drugs, and that we become used to the idea that there is a harmful threshold dose, which may be 100 or 200r. At the same time it is necessary to stress that 1r is probably no more harmful than 1 grain of aspirin, and equally safe to administer, while a dose of 200r for whatever purpose it is given must be viewed with just as much caution as a dose of 200 grains of aspirin.

London, W.1. J. RABINOWITCH.

7. Simpson, C. L., Hempelmann, M. D., Fuller, L. M. *Radiology*, 1955, **64**, 840.
8. Metcalf, R. G., India, F. A. *In* Biological Effects of External Radiation, by H. A. Blair. New York, 1954.
9. Furth, J., Upton, A. C., et al. *Radiology*, 1954, **63**, 562.
10. Furth, J., Tullis, J. L. *Cancer Res.* 1956, **16**, 5.

ENDOBRONCHIAL TUBERCULOSIS IN CHILDREN

SIR,—Recent preoccupation with the treatment of endobronchial and other forms of respiratory tuberculosis in children must not be allowed to conceal the more important question of prevention. Surely we cannot discuss complacently the findings in 150 thoracotomies at Sully Hospital (Nov. 10, p. 995) or even 12 major surgical operations this year at Brentwood (Dec. 1, p. 1160) when the children so treated are the victims of an entirely preventable disease? The full, sustained, and enthusiastic use of all the proven prophylactic measures must overshadow any other consideration.

But when intrathoracic tuberculosis still arises in childhood prolonged chemotherapy, with or without prednisolone, should exclude the need for any surgical intervention in all but the most exceptional case. Moreover, even if such treatment has no dramatic immediate effect on mediastinal lymphadenitis it will certainly reduce the risk of postprimary morbidity and mortality which—at 11% and 2% respectively (Brentwood)—are by no means insignificant. Admittedly, bronchiectasis

will sometimes complicate the healing process, but we know that frequently this will give rise to no symptoms; and very rarely again will surgical treatment be required, when adequate chemotherapy and postural drainage are practised.

Skilful thoracic surgery has a very small and rapidly disappearing part to play in the treatment of pulmonary tuberculosis in childhood, which is primarily a public-health and secondarily a medical problem.

Leicester. J. P. ANDERSON.

SOME EFFECTS OF HIGH ALTITUDE ON MAN

SIR,—May I thank Dr. Pugh and Mr. Ward for their fascinating article (Dec. 1)?

Their observation that at the point of exhaustion the men's main signs were of circulatory collapse, with a slow, irregular pulse, and a low cardiac output, is both unexpected and physiologically important. The mechanism responsible is not obvious, but surely it is unwise to exclude dehydration mainly on the presence of chloride in their urine? With such vast ventilation-rates, a large proportion of their water loss must be respiratory, and so would not involve any loss of salt. Dehydration, if it were shown to be an important factor, might easily be correctable on future occasions.

Myocardial anoxia may, of course, prove to be the most important factor, but others which might be concerned are the loss of central stimulation due to a reduced blood-pCO_2; and reduced reflex stimulation of the heart by pressoreceptors in the right atrium, since part of the syndrome described in anoxia is a low cardiac output accompanied by a low venous pressure.

Department of Biochemistry, Radcliffe Infirmary, Oxford. M. P. WRIGHT.

MEPACRINE *v.* CHLOROQUINE

SIR,—Your leading article (Dec. 1) on the control of systemic lupus erythematosus describes the most valuable work carried out on this subject by Dubois.[1] He found antimalarials to be of value in the less acute type of disease. I write to give a warning on the choice of antimalarials now that they may become more widely used. Dubois found that mepacrine, chloroquine, and camoquine all produced unpleasant side-effects when given for long periods, but mepacrine had the added disadvantage of staining the skin yellow, although he thought it was the most effective. My experience with mepacrine has been rather different.

My dosage of mepacrine in the treatment of rheumatoid arthritis in 65 patients did not exceed 200 mg. a day as a maintenance dose; yet 2 of them developed aplastic anæmia. Both of them recovered after a difficult period. But I know of 2 others treated elsewhere, 1 of whom died. On the other hand, I have treated more than 100 cases with chloroquine on a maintenance dose of 300–400 mg. daily, the majority for nearly three years, without this complication. This incidence of aplastic anæmia with mepacrine is much higher than that observed in its use as an antimalarial,[2] possibly because patients with these systemic illnesses are more predisposed to such toxicity. I have had no patient given chloroquine develop exfoliative dermatitis, but the dose has been reduced in a few because of a mild eczema. These are the two most serious complications of therapy with the 4-aminoquinolines. The other side-effects are tolerated by the patients though the dose may have to be reduced, usually without prejudicing effective therapy.

I should like to make it clear that patients have been maintained for these long periods not because there has been active arthritis present throughout, but because often relapse follows withdrawal of the drug. One simply does not know how long to continue, especially when the patient has no ill effect from the treatment. A report of my controlled trial of chloroquine in rheumatoid arthritis has recently been published.[3]

Dubois mentions that he has tried chloroquine, camoquine, mepacrine, and quinine separately and in combination, but discusses only combinations of the 4-aminoquinolines. In the treatment of rheumatoid arthritis I have found that, where the dose of chloroquine has had to be reduced because of some side-effect, the addition of quinine has produced better results than the first-alone. I have needed to use this combination in a few cases only and I can offer this simply as a clinical impression.

Hackney Hospital, London, E.9. A. FREEDMAN.

1. Dubois, E. L. *Ann. intern. Med.* 1956, **45**, 163.
2. Findlay, G. M. Recent Advances in Chemotherapy. London, 1951; vol. 2, p. 222.

ARTHRODESIS OF THE GREAT TOE

SIR,—Mr. Crymble's report (Dec. 1) is very interesting. He states: "The quality of the end result after arthrodesis of the . . . joint of the great toe is not so immeasurably better than that obtained by simple standard procedures as to justify its routine use in hospital practice." He shows that there is a longer stay in hospital, and more room for complications and he states: "This inquiry has also failed to show any grounds for the present apparent dissatisfaction with the time-honoured arthroplasty."

It is of importance that in the small series, which he admits is not large enough to draw final conclusions, but only to show trends, he is not comparing two comparable sets of patients. He says: "All the fusion operations in this series were done by orthopædic surgeons of senior rank, whereas most of the arthroplastics were done by men below the grade of registrar." He is therefore, comparing the results of treatment by experts with those of learners. If both sets of operations had been done by equally expert surgeons it is certain that he would have said that the series showed that the results of arthroplasty are immeasurably better than those of arthrodesis. That there are bad results after arthroplasty cannot be denied. At the risk of inviting severe criticism I would say that, to paraphrase a well-known dictum, "the bad results of Keller's operation are the results of a badly performed Keller's operation." Keller's operation is regarded as a minor one, but this is not the case. It is a small one, but small details in its performance make all the difference to the results.

At the risk of seeming to repeat what ought to be well known, I would say that the niceties of a good Keller's operation are:

1. Good aseptic technique. Do not touch the skin with the gloved hand. (The young house-surgeon does this within seconds of being warned not to do so.) Use two scalpels and dissecting-forceps—one set for the skin and the other for tissue. (The young H.S. consistently forgets this.) Do not let the swab rub the skin before going into the wound. (How many times have I reminded the young H.S. of this during one operation.)

2. Do not scratch-cut. (The young H.S. scratches and lacerates the tissues.)

3. Remove from half to two-thirds of the phalanx. (The inexperienced tend to remove only a quarter.)

4. Do not use deep sutures which cannot be removed when the skin sutures are taken out. Even absorbable catgut will leave a small hard mass which persists and causes pain. The pain is due to the thinness of the subcutaneous fat. When shoes are resumed this knob is squeezed between shoe and bone and causes pain in the skin.

5. Immobilise the hallux with plaster-of-paris for at least three weeks. Our aim is to obtain a flexible fibrous joint. Fibrous tissue does not mature for six weeks. If it is kept quiet and still during this period it will be minimal and flexible. If it is irritated by early movement it will be

3. Freedman, A. *Ann. rheum. Dis.* 1956, **15**, 251.

maximal and tough and the result will be a stiff toe. This, in my opinion, is a most important point.

6. When applying the plaster, mould the forepart of the foot so that the transverse metatarsal arch, whose existence is denied by some people, is corrected; for it is so often "reversed," particularly in hallux valgus.

7. Make sure that the operation is the correct one to relieve the patient's complaint. Robert Jones in 1925 emphasised that in many cases of hallux valgus the complaint is a pain in one or more dislocated metatarso-phalangeal joints—2nd and/or 3rd. If this is not dealt with the foot, however better-looking after the operation, will still be painful, the patient unrelieved, and the surgeon disappointed.

There are other details in the management of a patient which are of some importance. When advising the operation it is my practice to explain, in full detail, the aftercare. I tell the patient "three weeks in plaster, three weeks getting on to your feet again, six months for full recovery." When the plaster is removed warn them in advance that their feet will ache and swell for a few weeks and that they will not be able to wear their shoes at first. If you do not, they worry. A happy patient gives quickest and best results.

Length of stay in hospital is a matter, not of the type of operation, but of the wishes of the surgeon and the convenience and home facilities of the patient. The patients are not ill. They become bored in bed and are happiest at home. They can go home the same day or very soon after Keller's operation. Even my private patients elect to go home in two or three days. You notice I say "elect." It is a matter of putting it to the patient.

Is all this making too much fuss about this small operation? I submit it is not. If the details I have outlined are adhered to there will be no "apparent dissatisfaction" with the arthroplasty. I have not performed the arthrodesis, but I have seen a sufficient number done by colleagues on one foot and the arthroplasty on the other to know that a very high proportion of the patients prefer the arthroplasty. Despite my criticisms of Mr. Crymble's investigation I am glad to be able to support his general conclusion, but I wish it had been a stronger one.

Manchester. W. SAYLE-CREER.

SIR,—The article by Mr. Crymble confirms that Keller's operation is perfectly satisfactory for hallux valgus and rigidus. Nevertheless, he feels that "young patients with painful hallux rigidus, where operation is unavoidable, probably form a special group in which arthrodesis may be advantageous."

The results of a personal series of 38 arthrodesed great toes enable me to make a less carefully worded statement on the indications for arthrodesis. In my opinion, arthrodesis of the great toe joint is indicated whenever a hallux-rigidus sufferer wants a foot that allows him to pursue vigorous activities. Thus, one of my patients with an arthrodesed great-toe has climbed Mount Snowdon, another teaches dancing 6–8 hours daily, and a third, who has a hypermobile interphalangeal joint, can stand all day at a cash desk wearing court shoes with 4in. heels.

There is a second indication—namely, hallux valgus associated with dorsal displacement of the second toe and downward displacement of the second metatarsal head. The correct treatment is excision of the second metatarsal head and arthrodesis of the hallux. Such a patient, with a highly successful result, was recently shown at a clinical meeting of the Royal Society of Medicine.[1] If this patient had been treated by a pseud-arthrosis operation on the great toe and excision of the head of the second metatarsal, she would have ceased to put weight on the first and second metatarsal heads and would have walked on the outer three metatarsal heads, which sooner or later would have become painful.

Yet, in spite of my enthusiasm for arthrodesis of the great toe, I do not perform the operation frequently. I prefer to treat uncomplicated hallux valgus by either McBride's or Keller's operation and hallux rigidus by Keller's operation. These relatively simple procedures can be relied upon to give satisfactory results in the vast majority of cases. Arthrodesis of the great-toe joint, on the other hand, is a difficult operation and should be reserved for a carefully selected minority.

Lewisham Hospital, London, S.E.13. A. C. BINGOLD.

1. Bingold, A. C. *Proc. R. Soc. Med.* 1955, **48**, 614.

REPAIR OF FEMORAL HERNIA

SIR,—Must surgery for femoral hernia be so complicated? Since 1950 I have used nothing but the low approach, excising the sac thoroughly from below and closing the femoral canal with a single thread stitch passed on a fish-hook needle from inguinal ligament to pectineal fascia. In strangulated cases I use the same approach but do not hesitate in case of danger or difficulty to enter the abdomen through a paramedian incision; this has rarely proved necessary. The operation takes ten minutes; no muscle or aponeurotic layers are divided, and the patient may get up and even go home next day. I have yet to see a recurrence though I have seen inguinal hernia occur after a high repair. This approach was strongly advocated by Sir Cecil Wakeley in 1940.[1]

I believe that the abnormal obturator artery is a bogy responsible for a number of pretty but unnecessary anatomical exercises.

Weston-super-Mare. JOHN LL. TEMPLE.

THE USE OF PLASMA

SIR,—I must agree with Mr. Ruscoe Clarke (Nov. 10) that dextran is no substitute for blood, nor was it suggested that it could be. It can, however, be very valuable as an economiser of blood under conditions where blood is in short supply. Furthermore, can it be denied that blood is frequently transfused, not to save life, but to hasten convalescence? And is such a policy justified in view of the many risks entailed?

The primary object of my letter (Oct. 27) was obvious, but it was also desired to draw attention to the potential danger of plasma-transfusions, especially in the treatment of shock in cases of thermal injury. Dr. Wallace (Nov. 3) implies that plasma causes no hæmostatic defects when transfused but that dextran may do so. This is true only when fresh plasma is employed. Plasma recovered from stored blood or stored for any length of time in the liquid state has little or no hæmostatic properties and is known to produce hæmostatic defects—perhaps because of the large amount of citrate it contains.

Dr. Wallace also suggests in the light of Garrot Allen's experience that six months' storage at room-temperature of liquid plasma is all that is required to render it free from the risk of causing homologous-serum jaundice. While this may very well be true, it is not the simple solution to the problem that Dr. Wallace maintains it to be. Plasma and blood are safe for transfusion only because they have been kept continuously at a temperature well below that which will support bacterial growth.

If plasma were, in fact, stored for six months at room-temperature, then to transfuse it without very elaborate bacteriological control and very expensive biological tests and processing would be highly dangerous and the risks involved would far exceed those associated with the plasma used today, which has been continuously refrigerated prior to transfusing or drying.

Without seeing the figures on which Dr. Wallace bases his assertion, I cannot refute or agree with his statement that liquid plasma costs less to produce than

1. *Lancet*, 1940, i, 822.

commercial dextran. Dextran, however, costs £1 per bottle, and during the late war the Royal Naval blood-transfusion service, with a turnover of approximately 2000 bottles of blood per week, costed blood at about £2 per bottle. Since it takes two bottles of blood to produce one of plasma the implication is obvious. Costs, of course, have risen considerably since the war. Furthermore, the National Blood Transfusion Association of Ireland, a highly efficient organisation which operates as a non-profit-making company, just manages to pay its way by charging £2 per bottle for blood; and salaries, wages, and costs generally are probably lower in Ireland than they are in the United Kingdom.

London, N.W.3. S. G. RAINSFORD.

ARRANGEMENTS FOR THE MENTALLY ILL

SIR,—Three matters have been discussed in your columns recently: (1) the rôle of mental observation wards (Dr. Clark, Nov. 17); (2) the treatment of mental illness at a general hospital (Dec. 1, p. 1150); and (3) the relation of mental-illness laws to public opinion and their effect on the care of the mentally ill (Sir Russell Brain, Dec. 1).

I am greatly interested in these matters because, though a general physician, I have for fourteen years been in charge of a mental observation ward at the Central Middlesex Hospital. Each year about seven hundred cases pass through this ward, so I have seen nearly ten thousand cases. My especial interest has been in sorting out those cases with physical illness causing (or contributing to) their mental symptoms [1] and also in dealing with those patients with temporary mental upset who recover after a few days in the observation ward.

Mental observation wards were originally (and here I use the language of the Lunacy Act, 1890) parts of workhouses to which constables or relieving officers could remove lunatics and where the master of the workhouse could receive, relieve and detain them up to three days (53 Vict., Ch. 5, sec. 20) or for another fourteen days (53 Vict., Ch. 5, sec. 24). When I started as physician at the Central Middlesex Hospital in 1943 I regarded this legacy of the poor-law days as a rather tedious extra, but as the years have gone by I have found the work a clinically rich and mentally stimulating addition to my general medical work which I would be loth to relinquish. Yet there are several difficulties, because, although the Mental Treatment Act of 1930 and the National Health Service Act of 1948 changed many names (lunacy to mental illness and relieving officers to duly authorised officers, &c.), they left behind much of the old machinery from the 1890 Lunacy Act which still affects the attitude of the public and the difficulties of admitting and detaining patients. Almost all these patients are admitted under section 20 by an authorised officer (on a three-day order) and sometimes detained for a further period (under section 21a) on a fourteen-day order signed by me or my assistants. Some of them are people from the general side of the hospital who develop psychotic symptoms but the majority are sent in from their homes in the district.

Officially (see paragraph 48 of 1st day of evidence, Royal Commission) an observation ward is still "part of a hospital designated by the Minister for the reception of patients for short periods in emergency at the instance of a Duly Authorised Officer" and the official duty of the doctor "to examine the physical condition and record it in the register." Section 20 was written in the days when mental illness was none of the doctors' business and the mental observation ward a place where a mental case could be housed in emergency until a magistrate could be brought to see it. Naturally, with cases admitted to my ward, I have been unable to confine myself merely to recording their physical condition in a register but have taken an active interest in the diagnosis and management of both their mental and their physical condition. I would like to set out here some of the advantages of this "designated part of a hospital" being regarded as an observation ward and not purely as "for the reception of patients in emergency."

The Value of an Observation Ward

An observation ward attached to a general hospital is quite invaluable for these reasons:

(1) People admitted there realise they are in a general hospital, not a mental hospital, and hence feel less of the stigma of being mental cases.

(2) It is a good thing if patients admitted to mental hospitals have first passed through a mental observation ward and been screened by a general physician. The psychiatrist in a mental hospital usually welcomes the patient arriving with a provisional opinion from the consultant in charge (we send a photographic copy of our observation-ward notes to the mental hospital). The chances of patients avoiding unnecessary admission to mental hospitals is increased because of the double check on their deservingness for such admission—the physician in charge of the observation ward is one check, and the visiting doctor and magistrate the other.

(3) Many patients with general medical or surgical illnesses may develop secondary mental symptoms—the delirious pneumonias, the head injuries, the cerebral tumours, and many others. If there is a mental observation ward attached to a hospital these people can continue their treatment under the doctors that know their case, without being transferred to a mental hospital. It is also most beneficial to the other patients in a general ward if their mentally disturbed fellows can temporarily be moved out of the general wards.

(4) Facilities for laboratory investigations and consultant medical and surgical opinion being more easily available at a general hospital, investigation and treatment of physical causes of mental illness can be conveniently carried out there.

(5) If there are mental observation wards in a general hospital the unfortunate compartmentation of medical from psychiatric work is lessened. Particularly if an appointment (such as that which I hold) is established where one man has charge both of general medical and mental observation cases.

(6) I always have a firm of students attached to my unit. For teaching purposes a mental observation ward is invaluable. The assessment of the acute psychotic case and the early detection of organic causes for mental illness is just what is useful to practitioners, and that is just the sort of case we deal with in an observation ward.

(7) When a patient in a mental hospital develops a physical illness he can be transferred to a general hospital for investigation and treatment if there is a mental observation ward where he can stay. Also pregnant women with mental illness can be received during their confinement.

(8) Where the assessment of a suspected case of mental illness is difficult, it is far easier to judge the patient if he is under continuous observation for a day or so rather than try and decide at a short interview in his home. In an observation ward we see the patient eating, dressing, talking to his fellow patients and the nurses, and so on. A fair decision as to his sanity is hence the more easily made.

Difficulties of the Present Law

(1) I cannot admit cases to my own mental observation ward however deserving I think them. The authorised officers can refuse to admit cases I want to come in.

(2) A patient may be seen by the visiting magistrate and doctor and be certified soon after admission before I have visited him. I may want to keep the case for a few days' observation and investigation, but then I may not legally do so (except by pronouncing him too ill to be moved).

(3) I can issue a fourteen-day order (section 21a) and keep the patient in my ward for a fortnight, but if I want to keep a patient longer than that (for instance, when I am treating myxœdema or dementia paralytica) I have no legal way of doing so. Also I have to issue the order before the visiting doctor and magistrate have seen the case. I cannot issue a fourteen-day order unless the authorised officer has first issued a three-day order.

(4) If a man on the general wards becomes suddenly violent and psychotic I have to telephone the authorised officer and wait till he comes before I may transfer him to my mental observation ward. If, because of the emergency, I take matters into my own hands and move the patient over and then ask the authorised officer to visit him there, he may refuse to issue an order. (Technically the authorised officer cannot admit a case to a place to which he has already been admitted.) The authorised officer may demand (even if the patient is acutely ill) that he be moved out of the ward into the open air (outside the designated area) before he will issue an order.

The Authorised-officer System

I want to make it clear that I am criticising the system rather than the officers themselves.

1. *Trans. med. Soc. Lond.* 1954, **70**, 93.

(1) Authorised officers are not required to have any special education, training, or qualifications, although in actual practice they often obtain quite a high level of efficiency. They have a very large measure of power and responsibility.

(2) Quite often the authorised officer will not issue an order when a doctor wants a patient admitted. Reasonably enough he may hesitate to take this responsibility if he cannot satisfy himself as to the patient's unsoundness of mind. It may be that the mental symptoms are momentarily in abeyance when the authorised officer comes, it may be that he fails to elicit a well-concealed delusion, or it may be that the patient has attempted suicide and so is comatose.

Now if a patient is unconscious from barbiturate poisoning and there is a suicidal note and a previous history of melancholia then I am satisfied that he ought to be in an observation ward; but an authorised officer may say "How can I pass an opinion on his sanity when he cannot talk?" If such patients are in a general ward they may make further suicidal attempts on recovering consciousness when they are often in a kind of drunken confused state from the effects of the drug—liable to try jumping out of the window and noisy and irrational enough to disturb other patients.

(3) In mental work a full history of past and family mental illness as well as details of recent physical illness is essential. This history is usually taken by the authorised officer because he sees the patient's neighbours, relatives, and family doctor before bringing the patient in. Naturally as authorised officers have no official medical or psychiatric training the standard of such histories varies very greatly, nor is there any obligation on them to provide anything more than their reasons for considering the patient of unsound mind.

(4) The authorised officer is in no way responsible to the doctor in charge of the mental observation ward as a house-physician or registrar is. He is appointed by the local authority and nothing to do with the hospital.

(5) I cannot help thinking that some patients who are interviewed by an authorised officer may feel dissatisfied that their mental health is being assayed by a man of no special medical, psychiatric, or general standing. Admittedly many patients consider (in error) that they have been seen by a psychiatrist and are quite satisfied.

(6) Because the authorised officer has the final say as to whether a case is to be admitted, practitioners take less interest in the appraisal of their mental cases than they otherwise might, and refer their patients to the authorised officer as for a consultant opinion. They rarely send a letter with their cases, leaving this duty to the authorised officer, to whom they may send a brief note.

(7) Authorised officers seeing patients in their own homes often have to make the decision whether a patient should go to mental hospital as a voluntary or a certified patient—a decision of great responsibility and requiring much experience and skill. Perhaps this decision would be better in the hands of one with more medical and psychiatric experience.

Suggested Reforms

(1) I consider that selected hospital medical staff should be able to issue three-day orders, and also that it should be made possible for fourteen-day orders to be issued on patients in hospital even if they have not been admitted on an authorised officer's three-day order.

(2) I suggest that authorised officers should not have to take the responsibility of issuing orders. Their duties could be taken over by people with special medical and psychiatric training who could be responsible to the physician in charge of a mental observation ward.

(3) Authorised officers would still be needed to bring in acutely psychotic cases to the mental observation ward, but the decision whether to admit them or not should be left to the discretion of the hospital medical staff just as it is when a medical or surgical case is sent up for admission.

(4) I think it would be of benefit to the mental health service if most patients were admitted via mental observation wards because organic disease can be more easily filtered off there, the mental status accurately appraised, and the patients correctly graded as temporary, voluntary, or certified. At present (as Dr. Clark makes clear) the function of the mental observation ward is often taken over by the mental hospitals.

In conclusion I want to reiterate that of all the out-of-date legacies from the darker days of the Lunacy Laws, the authorised-officer system is the most antiquated. Even if their name is changed to mental-health officers and some of them attend a few psychiatric lectures (Dr. Macmillan, Nov. 24) the fact remains that the man called in to decide the fate of a patient with acute mental illness is usually an untrained layman who is not administratively responsible to the hospital where he takes the patient. The men themselves are often remarkably able and conscientious, and by long practice they may acquire equal or greater proficiency in the appraisal of mental illness than the practitioner who calls them in, but with no official requirements in training and no examinations to pass one cannot expect all authorised officers to be fitted for their duties by natural endowment. A month ago I was called to a lady with two weeks' confusion and stupor; the authorised officer would not issue an order, being unconvinced there was mental illness. I found the classical picture of a subdural hæmatoma, which was operated on within a few hours with excellent results. Here the natural acumen of the authorised officer made him unwilling to diagnose mental illness (especially as the lady had been quite normal until she fell downstairs), but such good fortune does not always obtain. Moreover when the patient's husband discovered that the man called to see his wife was not medically qualified he was extremely indignant and asked for a medical consultant opinion.

Surely the urgent assessment of a patient whose sanity is in question should be carried out by a doctor, and one of at least registrar status experienced in both physical and mental illness.

The occasion when lay opinion *is* needed is when certification has to be carried out. Then the magistrate stands by to see fair play, to ensure the patient is psychotic enough to convince a lay person and that his fate is not decided purely by a doctor. Such a second opinion is a valuable safeguard to the liberties and rights of the citizen.

May I add that much of the material in this letter was submitted two years ago to the Royal Commission on the Law Relating to Mental Illness.

London, W.1. RICHARD ASHER.

TREATMENT OF CHRONIC OSTEO-ARTHRITIS WITH COBRA VENOM, FORMIC ACID, AND SILICIC ACID

SIR,—The conventional treatment of chronic osteo-arthritis is unsatisfactory. Bryson [1] treated 466 patients with 'Nyloxin,' a mixture of cobra venom, formic acid, and silicic acid, and claimed 91·4% success; and Lumpkin and Firor [2] recorded substantial relief of symptoms in more than 80% of their 88 patients.

I have treated 43 patients with nyloxin, and 43 (who had arthritis of similar severity) with sterile water as controls: none knew which he was receiving. The diagnosis was confirmed in every case by X-ray examination. All had been treated in hospital and were not improving.

The injection solution, a clear liquid, was given once a week subcutaneously, the initial dose being 0·5 ml. in each of two sites, increasing by 0·25 ml. in each site to a maximum of 1 ml. The two deltoid regions or the anterior part of the thighs, 3 or 4 in. above the knee, were most suitable. If there was local pain or increased joint pain, the dose was not increased, and if the pain was prolonged for more than two days the dose was reduced by half. Each injection took five minutes, since it may be painful if given quickly; other workers have used procaine but I found it unnecessary. The interval between injections was steadily lengthened after symptoms were controlled. No other treatment was given, and cortisone and corticotrophin were gradually withdrawn from those receiving them. I found no toxic reactions, except for a local allergy in 1 case, which responded to anti-histamines; previous reports had mentioned no contra-indication.

1. Bryson, K. *Amer. Surg.* 1954, **20**, 751.
2. Lumpkin, W. R., Firor, W. M. *Ibid*, p. 756.

The results, which are shown in the accompanying table, were first recorded after six months on the average,

Treatment	No. treated	Results		
		Satisfactory	Encouraging	Unsatisfactory
Nyloxin	43	34 (79%)	6 (14%)	3 (7%)
Sterile water ..	43	0	0	43 (100%)

although response was usually evident after six to eight weeks. The factors considered in assessing results were: (1) euphoria and relief of pain; (2) decreased stiffness of joints; (3) increased mobility; (4) whether improvement, if any, was sustained; and (5) absence of side-effects.

The following cases illustrate the improvement achieved.

A man of 56 had severe pain in the right hip, which often woke him at night. Movement was limited to 20° abduction and 30° flexion. X-ray films showed gross osteo-arthritis, and operations had been recommended. A week after the second injection all pain had disappeared, and he slept all night for the first time in three years. The joint can now move through 30° abduction and 60° flexion, and he has resumed heavy work after two years of incapacity.

A man of 62 had pain and stiffness of both knees. After the seventh injection these had gone, and after the twelfth he could play golf, which he had had to give up seven years before.

A woman of 73 had moderate osteo-arthritis of both knees which had been static for fifteen years despite many treatments. After 12 injections she walks a quarter of a mile with ease, though before treatment she could walk only 150 yards without pain.

The number of cases is small, the period of follow-up only one year, and there has been no radiological change; but these preliminary findings are encouraging.

'Nyloxin' is produced by Hynson, Westcott, & Dunning, Inc., Baltimore, 1, Md., U.S.A.

London, W.8. S. BALFOUR-LYNN.

PREVENTIVE PSYCHIATRY

SIR,—Everyone who is concerned with mental health will have been interested in Dr. Macmillan's account (Nov. 24) of his "joint-user" service for the aftercare of patients from the mental hospital. This association would agree with much of what Dr. Macmillan says in regard to the need for social work and is only too well aware of the shortage of trained psychiatric social workers which has made it impossible for Dr. Macmillan to staff his social-work department with appropriately trained workers.

However well the arrangement works in Nottingham, we would deprecate the extension to other areas which might follow his contention that social workers with a little supplementary training in psychiatry given at the hospital are adequately equipped to work on the same level as fully trained psychiatric social workers.

Lectures are not a substitute for the understanding of the problems of human relationships which only case-work under expert personal supervision can give. Further, Dr. Macmillan does not state whether all the social workers employed by the hospital and in the local authority have a general basic social-work training. We know from our good contact with the mental health officer of Nottingham that the joint-user service there works very well but are sure that the mental-welfare officers themselves emphasise the need for adequate and specialised training. Indeed they, as well as ourselves, are pressing for recognition by the Ministry of Health of the need for training in the fields of mental welfare. This point is endorsed by the letter (Dec. 1) from the National Association for Mental Health.

The Mackintosh report (1951) has never been fully implemented, but this association, in an endeavour to overcome the shortage of trained psychiatric social workers, has established a trainee scheme which has been working for some years. Trainees, while preparing for the full university course, work on the care and aftercare of patients as salaried staff of mental hospitals under the supervision of qualified psychiatric social workers.

In conclusion, we welcome all efforts to overcome the shortage of staff and to make the best use of available personnel. We do not, however, think it is in the best ultimate interests of social work in the psychiatric field to suggest that shortened and simplified training can be more than an emergency measure or provide a fully satisfactory service in an integrated mental-health scheme. Although we agree with Dr. Macmillan that the social worker must have "the right personality and outlook" this alone without specialised and supervised training in social case-work is not enough to ensure that a high standard is established and maintained.

MARY A. LANE
Chairman,
Association of Psychiatric Social Workers.

1, Park Crescent,
London, W.1.

DANGEROUS CONTAMINANTS IN STORED BLOOD

SIR,—The paper by Dr. M. G. McEntegart (Nov. 3) is both interesting and instructive. I would like to comment on one or two points.

Dr. McEntegart remarks that the presence of small numbers of bacteria which cannot multiply in blood during storage is possibly common. The following is my experience.

For many years in the Welsh regional transfusion laboratory all *unused* blood returned from hospital banks has been cultured. Unused blood comprises (*a*) bottles never opened and (*b*) bottles opened for compatibility tests. Pilot tubes are not used. All bottles of blood are issued sealed to hospital banks. The seal is of 'Cellophane' incorporated into a crushed lead seal such as is used by H.M. Customs. It is impossible to open the bottle, or sample its contents, without breaking this seal. If the seal is not intact the bottle is classified as having been opened or sampled. In the period January–October, 1956, bottles of blood issued to banks totalled 20,149 and, of these, 7·9% were returned unused. Results of cultures on this unused blood were:

Bottles of blood	*Total cultured*	*Found infected*
Unopened	1129 ..	4 (0·35%)
Opened, but unused ..	468 ..	24 (5·1%)

The roll-tube (glucose-agar) culture method has been routinely used, and to 5 ml. of culture medium 1 ml. of inoculum (blood-plasma) is added. Cultures are kept at room-temperature for 3 days, then at 37°C for 2 days. Organisms grown are referred to the department of bacteriology, Welsh National School of Medicine, for identification. Brewer's medium was for a while jointly used but did not seem to offer advantages over the roll-tube culture method. No pathogenic organisms were cultured from unopened bottles. From 6 (1·2%) of the opened bottles pathogenic, or potentially pathogenic, bacteria were grown. These comprised coagulase-positive staphylococci from 3 bottles, while the remaining 3 yielded *Escherichia coli*, *Bacterium aerogenes*, and *Streptococcus viridans*. Contamination of at least some of the unused opened bottles was due, I believe, to their being opened, preparatory to transfusion, in wards or operating-theatres. Cultures have been taken from blood of unopened bottles for many years, but pathogenic bacteria have never been recovered.

Remnants of blood in used bottles are cultured only if referred for investigation because of transfusion reactions. Often, despite a severe reaction (e.g., rigor, chill, or collapse), culture of the remnant of donor blood proves sterile. The finding of bacteria in the remnant of donor blood which caused a reaction is, of course, not evidence that they were responsible for the reaction, for they may have been introduced at the time of, or after, transfusion. Often, for example, bottle caps are left lying about during transfusion, so collecting airborne organisms. Again, a non-sterile cap from another bottle may be used to close the bottle after transfusion. Used bottles may be returned uncapped or simply with a wool plug

in the aperture. Again, organisms may be introduced by a non-sterile enema syringe used to blow air into the blood bottle to speed transfusion with positive pressure. The organisms introduced will probably not cause a reaction, but they are likely to increase in the remnant of donor blood. In many severe reactions the remnants of donor bloods prove sterile on culture. Proof that an organism caused a transfusion reaction depends on recovering it from the remnant of donor blood and from the recipient's blood. I have never known this happen, for clinicians seldom culture the recipient's blood when febrile reactions occur. Also, in doing necropsies when death is thought to be due to transfusion, pathologists sometimes omit to take samples of blood for culture. In the two cases reported by Dr. McEntegart in which death is attributed to gram-negative bacilli recovered from remnants of donor bloods, blood for culture was not taken from the recipients either ante or post mortem. The verdict in these cases must be "not proven." Bottles of culture-media ought to be available in all blood-banks so that, should febrile reactions complicate transfusion, the clinician may immediately culture the recipient's blood. The time to do this is during the reaction, not some hours later.

The source of the organisms in Dr. McEntegart's two cases may, apparently, have been the plastic-cap preservative fluid. Dr. McEntegart suggests that these organisms, which multiply at low temperature, may have entered the bottles through the tracks in the rubber wads left by the blood-taking needles, such entry being facilitated by contraction of the cap and cooling of the blood. This may be so, though the explanation is possibly slightly different. When the blood-taking needle is withdrawn a film of blood may be left in its track through the wad. From a film of fluid under the cap, organisms could grow along the film of blood left in the track of the blood-taking needle and so enter the bottle. Accordingly, the use of sterilised caps does not seem to be the answer, since a film of either blood or cap-preservative fluid might be left between cap and wad. This film could become contaminated either by airborne organisms which settled on the bottle cap during phlebotomy, or by organisms from the fingers of those who handled the bottle. For this reason the persistence of a film of fluid or blood on the surface of the rubber diaphragm, particularly over the perforation left by the blood-taking needle, is undesirable and, therefore, it seems best not to use plastic bottle-caps. The omission of such a cap will ensure that no film of fluid or blood will persist on the surface of the rubber wad. After blood collection the surface of cap and wad should be wiped dry with sterilised lint or towel. Plastic caps are, in any event, not always effective seals, for it is sometimes possible to remove the metal cap with plastic cap intact and replace it so. This being so, it may be impossible to tell whether or not a bottle has been opened.

It is to be hoped that studies will be made to ascertain whether the organisms described by Dr. McEntegart produce endotoxin or exotoxins and, if so, their nature and antidote, if any. Apparently, the noxious effects of such organisms are produced by their toxins and not by their proliferation after introduction into the body. Experimental evidence hereon might be useful.

R. J. DRUMMOND
Medical Director.

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AN ERROR TRACKED TO ITS SOURCE

SIR,—In a letter which appeared in your issue of Nov. 26, 1955, Sir Selwyn Selwyn-Clarke questioned my accuracy (in an article published two weeks earlier) in ascribing to Galen the phrase "Employment is Nature's best physician, and is essential to human happiness," but did so in the politest possible terms, saying: "Would the authors add to my debt to them by giving the actual source where this wise saying can be found?"

He has had a long time to wait for his answer, but it may gratify him to know that his doubts have given rise to an extensive search of both secondary and original sources on my part, and that several colleagues more learned than I (including Dr. Iago Galdston, of the New York Academy of Medicine, Prof. John Fulton, of Yale, and the eminent Greek scholar, Gilbert Highet) have joined in the quest.

I am obliged to Dr. K. Rawnsley of this unit for having found the answer to this problem, on p. 81 of *Occupational Therapy Source Book*, edited by Sidney Licht (Williams & Wilkins, Baltimore, 1948). In his foreword to a paper first published in Boston in 1914 by Dr. Eva C. Reid, an ardent advocate of ergotherapy, Dr. Licht points out that here for the first time appears "that famous quotation attributed to Galen which has since found its way, in one form or another, into dozens of pamphlets, papers and books." Galen did *not* say "Employment is nature's best physician," but he did (in the first book of *De Sanitate Tuendæ*) write "Exercise is Nature's physician," in a passage which was cited in Burton's *The Anatomy of Melancholy*. An imperfect recollection of this passage, coloured by her own zeal for work therapy, led Dr. Reid to coin a memorable misquotation.

It is a pity that Galen was not its author; but the phrase is too eloquent to be rejected. I shall continue to use it in lectures on occupational psychiatry, but, thanks to Sir Selwyn Selwyn-Clarke's vigilance and my colleague's detective work, I shall in future ascribe it to its proper author, Dr. Eva Reid.

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G. M. CARSTAIRS.

P.S.—If Sir Selwyn Selwyn-Clarke knew this all the time, I shall never forgive him.

PREGNANCY IN ACUTE LEUKÆMIA TREATED WITH 6-MERCAPTOPURINE

SIR,—The association of leukæmia and pregnancy is not very uncommon. In most of the examples reported the patients had chronic leukæmia. Where pregnancy has been associated with acute leukæmia, this has usually developed during the pregnancy; it is rarer for pregnancy to start in a patient who already has acute leukæmia.

Acute leukæmia is often treated with 6-mercaptopurine (6-M.P.), which is especially damaging to embryonic tissues, being directed primarily against relatively undifferentiated cells. Experiments with tadpoles [1] and rats [2] have shown the danger to the fœtus of using this substance. In rats 6-M.P. induced fœtal death or stunting of growth in surviving fœtuses. The fœtus was most sensitive at the time of implantation—i.e., the seventh or eighth day in the first seven or eight days of gestation—when two doses of 5 mg. per kg. induced death and resorption of half the fœtuses and two doses of 10 mg. per kg. induced resorption of 90%.

We have treated with 6-M.P. acute lymphatic leukæmia in a young woman who, after this treatment had been started, conceived and was later delivered of a 30-week infant which lived for two days and which was apparently normal. The 6-M.P. was given before and after conception in a dosage of 2·5 mg. per kg. daily, and as far as we could ascertain produced no ill effects on the child.

The patient, a white woman aged 25, was first seen on Sept. 23, 1955, after being ill for a month with weakness, malaise, tiredness, effort dyspnœa, pallor, and spontaneous bruising. On examination she was pale, with a two-finger-breadth, smooth, non-tender enlargement of the spleen, and three-fingerbreadth enlargement of the liver. She was menstruating at this time. A blood-count showed hæmoglobin 4 g. per 100 ml., packed-cell volume 8%, and white cells 8400 per c.mm. (40% polymorphs and numerous primitive cells,

1. Bieber, S., Bieber, R., Hitchings, G. H. *Ann. N.Y. Acad. Sci.* 1954, **60**, 207.
2. Thiersch, J. B. *Ibid*, p. 220.

probably lymphoblasts, in the peripheral blood). Bone-marrow was very cellular and consisted of practically nothing but primitive lymphoblasts.

Acute lymphatic leukæmia was diagnosed. 6 pints of blood was transfused, and 6-M.P. was administered in a dosage of 2·5 mg. per kg. body-weight daily. She was discharged on this dosage on Oct. 6, 1955. A week later her hæmoglobin, which had been 13·5 g. per 100 ml. on discharge, was 9·5 g. per 100 ml. The 6-M.P. was continued in the same dosage.

On Oct. 21, 1955, she had another normal menstrual period; her hæmoglobin was 5 g. per 100 ml. and white cells numbered 2000 per c.mm. She was given 7 pints of blood and placed on cortisone therapy (300 mg. the first day, 200 mg. the second day, and 100 mg. daily thereafter). The 6-M.P. was continued. She had no menstrual period in November and December, and pregnancy was confirmed by pelvic examination. Treatment was continued as before.

She was readmitted for further blood-transfusion on March 5, 1956, and was discharged on March 12, the medicines being continued throughout. Prednisone 20 mg. daily was substituted for cortisone in the middle of April, but she required readmission on April 20 for further blood-transfusion.

The next few months were very stormy as she had multiple complications due to sepsis—otitis media, throat infection, urinary infection, and large intramuscular abscesses. These were treated with antibiotics, surgery, and blood-transfusion.

She went into labour on May 20, 1956, and was delivered of an infant weighing 3 lb. 3 oz. The infant, which seemed healthy, was not anæmic and a peripheral blood smear was normal; but it died after forty-eight hours. The mother was eventually discharged from hospital on July 1, 1956. She was seen as an outpatient on July 13, and she died suddenly at home a few days later. There was no necropsy.

Necropsy on Infant (Dr. P. Brain)

"The external appearance and all the internal organs were normal to the naked eye. The bone-marrow appeared to be normally distributed. On histological examination the lungs showed well-marked hyaline membrane in the atria with poor aeration of the alveoli. Extramedullary hæmopoiesis was taking place in the liver though the foci were small. These foci were not present in the spleen. Other organs showed no significant abnormality. There was thus no evidence of congenital deformity or of hæmatological abnormality."

When the pregnancy was discovered there was much discussion as to whether it should be allowed to continue. In the end we decided to allow Nature to take its course. We were aided in our decision by Thiersch's report [2] that, in contradistinction to larger doses of 6-M.P., doses of 2·5 mg. per kg. daily (which we were administering) had little effect on rat fœtuses. Larger doses would possibly have resulted in abortion or the birth of a living monster.

C. MERSKEY
W. RIGAL.

Department of Medicine,
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THE WAY WE LIMP

SIR,—Your leading article of Dec. 1 is a welcome reminder that simple measures can be of great value, and the mechanical principle that you quote in favour of the walking-stick gives scientific support to what many of us would feel is the most useful practical way of limiting the strain on a diseased hip. It is worth mentioning that patients must be told to hold the stick in the hand on the opposite side to their bad hip, as many will not see the point of this unless it is explained to them.

When you come to discuss fractures of the neck of the femur you raise some points which are, I think, less worthy of general acceptance.

It has been stated that the more vertical the fracture-line, the more likely is non-union. In a series of cases that I hope to report soon, I have been unable to confirm this relationship; while Watson-Jones,[3] arguing from Linton's [4] work, points out that the obliquity of the fracture-line indicates merely the extent of the displacement. This can be appreciated immediately when, as occasionally happens, an "impacted" fracture becomes "disimpacted"—in other words, a further displacing force is applied and the displacement is increased.

Later you state that avascular necrosis is rare when the normal angle between the femoral shaft and neck is preserved. I have found this complication distressingly common in any circumstances, though perhaps slightly less so when the fracture has been reduced really well. Avascular necrosis will most likely be found to be due to the vagaries of the blood-supply, not only of the femoral head, but also of the femoral neck. Evidence that the blood-supply of the neck is considerably impaired in at least 20% of these fractures has been provided by the researches of the Judets and their co-workers.[5] The progress of creeping substitution will be delayed inevitably in such cases, and it is best aided by accurate reduction and good immobilisation of the fracture by a well-placed nail until the bone unites, and thereafter by relief from strain in the use of a walking-stick.

London, W.1. R. A. J. BAILY.

A SIMPLE SELECTIVE TEST FOR NURSES

SIR,—Many candidates accepted for training in mental nursing prove unsuitable in temperament or ability; and some ten years ago the Working Party on the Recruitment and Training of Nurses advocated the use of selection tests to reduce this wastage. But, though individual hospitals [6] have successfully devised methods of nursing selection, no comprehensive techniques have yet been put forward which have found general acceptance.

A candidate's intelligence and emotional stability can usually be satisfactorily measured by standard tests supported by an interview, but it is not so easy to judge her ability to benefit from the theoretical side of the training course. This may be particularly important in areas where hospitals are desperately short of nurses, and where some of the applicants, despite adequate intelligence, are poor scholars.

To meet this difficulty I have devised a simple method of assessing a candidate's ability to cope with the written word. It takes only 15 minutes and can be given to individuals or to large groups simultaneously. It tests the candidate's ability to read and understand technical matter, to grasp what a question requires, to concentrate on a specific point, and to read analytically in order to extract information of a particular kind from a paragraph of heterogeneous material. The text I use is a paragraph from the nurses' edition of Furneaux's *Human Physiology*, together with 25 questions on it requiring one-word or two-word answers. The beginning of the passage and the relevant questions run as follows:

The cerebellum consists of two lateral hemispheres, with a narrow middle lobe between them. It lies behind the pons and medulla and under the cerebrum from which it is separated by a covering of dura mater known as the tentorium cerebelli. In structure, the cerebellum is very different from that of the cord and brain stem, for its grey matter is outside, with detached grey masses inside, as in the case of the cerebrum. . . .

Answer the following questions in 1–3 words by referring to the above text. The time you take will affect your score, so work as quickly as you can.

1. What separates the two hemispheres? .....
2. What lies in front of the cerebellum? .....
3. Is the middle lobe wide or narrow? .....
4. What is the dura mater called? .....
5. Is the grey matter of the cord outside? .....

I have given the test to groups of nurses in general and mental hospitals, to nursing applicants, and to nursing cadets. A frequency distribution-curve produced by

3. Watson-Jones, R. Fractures and Joint Injuries. Edinburgh, 1955; vol. II.
4. Linton, P. *J. Bone Jt Surg.* 1949, **31B**, 184.
5. Judet, J., Judet, R., Lagrange, J., Dunoyer, J. *Ibid*, 1955, **37A**, 663.
6. Petrie, A., Powell, M. B. *Lancet*, 1950, i, 363.

plotting the scores against the number of individuals obtaining them is positively skewed with a mean of 92%. All nurses obtaining 85% or over have so far succeeded in their examinations, and no nurse obtaining less than 50% has either passed her examinations or been considered suitable for nursing in other respects. Since the intermediate group are regarded as satisfactory in some aspect of nursing, the raw score of 13 out of 25 makes a suitable provisional cut-off score in the application of the test.

It must not be assumed, however, that all samples of nursing applicants are similar, for there is some evidence that real differences exist between nurses trained in London hospitals and those trained in the provinces, as well as between those trained in general and in mental nursing. I should be grateful, therefore, for any results obtained in other parts of the country, and I should be glad to send copies of the full test to anyone interested.

I wish to thank Miss L. B. Stanton, principal tutor, Darlington Memorial Hospital, and Mr. J. Lindsay, principal tutor, Winterton Hospital, Sedgefield, for their very considerable assistance. The extract from Furneaux's *Human Physiology* was used, and is here reproduced, with the kind permission of the publishers, Messrs. Longmans Green & Co.

Winterton Hospital,
Sedgefield,
Stockton-on-Tees. L. R. C. HAWARD.

CLINICOSIS

SIR,—The correspondence under this heading has been stimulating; it should benefit both medical officers of health and general practitioners. The matter has been so well ventilated that I hesitate to participate, and do so only because there has been scant reference so far to the views of those who use these clinics, which are surely not unimportant.

I conducted an inquiry [1] to discover what mothers really thought about the child-welfare centres. The replies (which were anonymous and were dropped into a sealed ballot-box) showed that the great majority brought their children because they wanted "expert advice," "a check on progress," and "to relieve anxiety."

The attendances since 1948 show that these centres are as popular as ever, many of those who attend do so, not because a health visitor has suggested it or because welfare foods can be obtained at a cheaper rate, but because they and their friends and neighbours believe in them.

When the general practitioner has the time and the inclination to set up child-welfare clinics in his own surgery, and uses the expert assistance of the health visitor, these local-authority clinics will no longer be necessary.

Evidently this time is still very far distant.

Hendon, London, N.W.4. H. D. CHALKE.

SIR,—I have no wish to carp, quibble, or make debating points but I cannot understand how one "devoting his time entirely to the health and disease of children" (Dr. Cook, Dec. 8) can be a general practitioner. At least it is clear that he is not a family doctor. In fact, he is not a general but a narrowly limited practitioner, a specialist, though not a consultant. No doubt every family could be cared for by a number of analogous specialists, practising either independently or in some sort of group, but there would be an end to general practice. The family doctor would have ceased to exist; specialists, grouped or ungrouped, would have taken his place. Surely we must decide whether that is what we want and not just drift there.

I saw lately the mother of an English family now resident in Geneva. She said that in Swiss towns general practitioners no longer existed; there were only specialists. She did *not* think it was a good idea.

London, N.W.3. LINDSEY W. BATTEN.

1. *Lancet*, 1956, i, 571.

Parliament

Public Health Officers (Deputies) Bill

THIS Bill, which Mr. J. K. VAUGHAN-MORGAN introduced as a private member's Bill, received its second reading in the House of Commons on Dec. 7. It implements a recommendation made by the Local Government Manpower Committee in 1951 that it should no longer be necessary for the Minister of Health to give his consent to the appointment of medical officers of health, deputy medical officers of health, and public-health inspectors. Mr. Vaughan-Morgan explained that it had been possible to abolish the need for consent for appointments for M.O.H.s and public-health inspectors by powers taken under an Act of 1872, but the powers of this Act could not be applied to deputy M.O.H.s, for they were originally appointed only by an Act of 1875. He understood that there was an average of 80 consents given by the Minister each year, and he was glad to say that the effect of the Bill would be to abolish the necessity for 80 communications to be made to the Ministry of Health, and for 80 replies to be sent from that department.

Miss PATRICIA HORNSBY-SMITH, parliamentary secretary to the Ministry of Health, welcomed the measure on behalf of the Government.

Public Health

Assistantes Sociales

IN Britain, for some time past, we have been trying to define the kind of health and social worker best able to meet the needs of the family without undue cost in time, money, and woman-power. Our main problem is to secure home visits by workers experienced in particular branches and yet avoid a multiplicity of visits by different specialised workers.

Monsieur P. Laroque and Sir Allen Daley have written an excellent report [1] on a survey of health and social workers in France and England. The survey, sponsored by the Rockefeller Foundation and the European regional office of the World Health Organisation, fits in with the declared policy of W.H.O. to assist governments to strengthen their health services by stimulating the coördination of health policies and the exchange of experience between countries.

The French social services depend largely on general-purpose social workers, whereas under the English system there is a great variety of specialised workers. The aim of social work in the widest sense is to improve material and moral conditions; and social workers try to obtain this result, as far as possible, by encouraging individuals and families to make their own decisions and act for themselves. In England health visitors, who, broadly speaking, are general-duty social workers in the field of health, are attached to the departments of the local health authorities. In France, where there are more general-duty social workers, they are responsible to a variety of services and organisations. The report states that the best solution would be to attach general-duty social workers to a body responsible to the local authorities.

In England there are many different training systems for social workers. Sometimes university training is taken, sometimes vocational course, and sometimes a purely empirical training. In France, on the other hand, there is a single, polyvalent (defined by the authors as plurality of competence) training which is compulsory for all *assistantes sociales*, whatever their particular duties after training, and whether they are destined to become polyvalent or specialised *assistantes sociales*. The first year of training, which is the same for nurses, is followed by two years' special training. Those who subsequently wish to specialise can take an additional course.

The report suggests that there is room in both specialised and general-duty social workers; and it shows, perhaps, a slight preference, in all but exceptional cases, for the general-duty health worker. But the adminis-

1. Health and Social Workers in England and France. Geneva: W.H.O.

trator in doubt whether to appoint a general-duty or specialised social worker will find the arguments clearly set out.

Possibly the solution lies in the appointment of a general-duty social worker (*assistante sociale de secteur*), to deal with all routine matters for each family in her sector but who, where need arises, calls in a specialised social worker. The report wisely states no preference for the French or for the English systems.

"A la vérité les uns et les autres ont leurs qualités et leurs défauts.

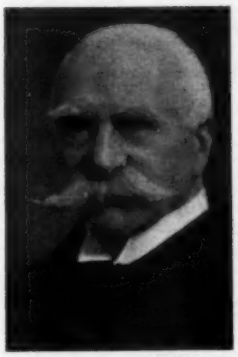
"Chaque pays a bien le chant national qui lui convient".[2]

Obituary

JOHN OGLETHORPE WAKELIN BARRATT
M.D., D.Sc. Lond., F.R.C.P., F.R.C.S.

Dr. Wakelin Barratt, who died at his home in London on Dec. 1 at the age of 94, worked in a period when each of the specialties was not so clearly segregated as today, and in this freedom he moved with distinction from one to another as his interest shifted from physiology to neuropathology, from tropical medicine to cancer.

He was born in 1862 at Birmingham where his father was a doctor. He qualified L.S.A. in 1888 from University College, London, and after some postgraduate years at the universities of Göttingen and Munich he returned there in 1893 to work in the physiological and pathological laboratories. In 1897 he moved to the London County Asylums laboratory, and his work there led to his appointment as pathologist to the West Riding Asylum at Wakefield. In 1903 he was awarded a British Medical Association research scholarship, and the following year he became assistant bacteriologist at the Lister Institute. In 1906 he moved to Liverpool on his appointment to the university department of cytology and cancer research, only to leave the following year to join the expedition which the Liverpool School of Tropical Medicine was sending to Nyasaland to study blackwater fever. On his return he was appointed director of the university cancer research laboratory. He gave up this post in 1913 and during the 1914–18 war he served in France with the 1st London (City of London) Sanitary Company. After he was demobilised he held for a time a Beit research fellowship.



[*Elliott & Fry*

During his long and active retirement in London he continued to take a lively interest in research and in the many professional interests which he acquired over the years. In 1933–34 he served as master of the Society of Apothecaries. He was interested in the history of the society and he spent much time studying and copying its early records and minutes. For many years he regularly attended its meetings and those of the Royal College of Physicians. His upright figure, distinctive moustache, and slightly old-world clothes caught the eye, and many colleagues in the past year or so have missed him from their gatherings.

Dr. Barratt married in 1913 Dr. May Gardner, formerly an assistant bacteriologist at the Lister Institute, who survives him.

Memorial services for Sir LIONEL WHITBY have been held at Downing College, Cambridge; at Great St. Mary's, the university church; and at the Middlesex Hospital, where Prof. John Kirk read a passage from *Pilgrim's Progress* and Sir Gordon Gordon-Taylor gave an address. Lady Whitby and her family ask us to thank all who have sent messages of sympathy. She hopes she may be able to answer each one personally.

2. Simon, P. A bâtons rompus. London, 1943.

Notes and News

MALTA

HAVING visited Malta at the request of Mr. Mintoff, the prime minister, Mr. John Cronin, F.R.C.S., M.P., has reported on reorganisation of its medical services. Though they gave him their opinions, the Medical Officers' Union did not put their evidence before him formally, and he does not discuss the recent dispute between them and the government.

There is urgent need, he says, of more and better equipment in all the hospitals, and for more accommodation, which should include a new general hospital. Stricter cleanliness and more attention to the welfare problems of hospital patients are needed; and it is not in the public interest that so few specialists should have all the general-hospital beds under their care. Despite the devotion and kindness of the sisters of charity, nursing standards need to be raised by building a College of Nursing which would train candidates for State registration. Early attention should also be given to the building of a medical school, and Mr. Cronin recommends that four professors (of medicine, surgery, obstetrics and gynæcology, and pathology) should be appointed as soon as possible, their posts being whole-time without private practice.

At present there is no medical disciplinary tribunal, and he suggests that the disciplinary functions performed in this country by the General Medical Council should be undertaken by a tribunal of three, consisting of a judge (as chairman) and two doctors, nominated by the government and the Medical Officers' Union. To present medical opinion to the minister of health, he would have an advisory council, which the minister could (but need not) consult.

Mr. Cronin looks forward to the eventual abolition of the district medical service in its present form, and meanwhile advocates some improvements both for patients and doctors. In the establishment of a national health service by progressive steps, he would begin with free general-practitioner services (perhaps at first for limited sections of the population), followed by free hospital services, and later by free dental services. Practitioners should be paid by capitation fee, and all drugs and dressings should be free. In a free hospital service consultants would receive sessional fees, weighted to increase the remuneration of those whose specialties involve more skill or whose work is more arduous. He does not think such a service would impose a heavy additional burden on Malta's economy. "With the important proviso of prudent administration, and discounting expansion to meet dire need," a national health service "involves no more than a redistribution of resources which are, at any given time, being expended on the pursuit of health under a régime where private practice predominates."

A NEW COBALT UNIT

THE first British-made full-size cobalt telecurie therapy unit was opened in the radiotherapy department of the London Clinic on Dec. 4. Sir Horace Evans performed the ceremony and Sir John Cockcroft, F.R.S., spoke about the new unit from his point of view as director of the Atomic Energy Research Establishment at Harwell, from where the cobalt came. The source of radiation, cobalt 60, was, he said, one of the most important radio-isotopes produced by the transmutation of elements in the atomic pile. The radium units in use twenty years ago had contained only 2–3 g. of radium, Sir John remarked: the cobalt in the new unit was equal in activity to about 500 g. of radium.

The radiotherapy department of the London Clinic is under the direction of Dr. W. M. Levitt and Mr. I. G. Williams; and at the opening ceremony Dr. Levitt explained some of the features of cobalt therapy.

The intense sources of gamma-ray emitting isotopes now available make possible the use of simple, safe, and reliable apparatus for supervoltage radiotherapy, without the disadvantages inherent in large complicated electrical installations, such as the linear accelerator. From the clinical point of view the effects of radiation from cobalt 60 are similar to those from a 3-million-volt X-ray machine. One of the problems not encountered in X-ray machines is that the radiation cannot be turned off, so that it is necessary to shield the cobalt sources within a large mass of lead and tungsten alloy. In the unit at the London Clinic the very high penetrating power of the radiation means that the weight of this shielding mass is about $1^{3}/_{4}$ tons. The head of the unit is protected

to take up to 2000 curies of cobalt; at the moment it contains about 350 curies.

The source can be moved within the large shielding head until it is at the apex of a conical opening. Attached to the outside of the head directly in front of this opening is a beam-shaping device. This beam is normally rectangular in shape and by means of two handwheels either dimension of the rectangle may be changed independently of the other. The beam shaping is accomplished by interposing a series of copper-plated lead blocks between the source and the patient. The handwheel mechanism for moving these blocks is designed specially to make the most efficient use of the radiation coming from the source. This variable diaphragm, which is mounted on a rotating bearing in front of the conical aperture in the shielding head, itself weighs approximately $^1/_4$ ton.

The 2-ton treatment head had to be mounted so that it could be safely and precisely moved and adjusted. It is important that a given setting of the head should be easily repeatable if required for further treatments. Electrical controls provide a vertical rise and fall, rotation about a horizontal axis, and rotation about another axis which itself rotates about the first. To make these movements safe and precise, the supporting structure for the heavy head and diaphragm had to be very strong, and the entire installation weighs about $8^1/_2$ tons. The unit was built by Nuclear Engineering Ltd., of Greenwich.

The introduction of these megavoltage machines, whether gamma or X ray, has *not* dramatically changed the outlook for the cure of cancer. Some moderate improvement in results may be expected, and some cases previously untreatable can now be treated. As Dr. Levitt pointed out, their importance lies in the fact that because the maximum dose is not sustained on the skin surface, but a little below it, the painful and disfiguring skin reactions of intensive deep therapy are avoided or much reduced. Moreover, because of the much higher penetrating power and the more uniform absorption in all tissues, however dense, the dose from a megavoltage source can be applied more easily and with much less total radiation dosage, and consequently much less constitutional upset to the patient and less risk of bone necrosis.

A cobalt unit of comparable size to the one at the London Clinic was installed at Mount Vernon Hospital (the gift of the Canadian nation) some three years ago, and two American units have recently been installed at St. Thomas's Hospital and the London Hospital. Some smaller experimental units have been made in this country and are in clinical use, and several radium "bombs" have been converted to take small quantities of cobalt.

IN WILDEST HAMPSTEAD

Dr. Josephine Bell is of course a spiritual if not a lineal descendant of Conan Doyle's old teacher. The Bells are a resourceful family, and for the past twenty years she has been entertaining her colleagues and their patients with the adventures of Dr. David Wintringham. But truth to tell in *China Roundabout*[1] he is eclipsed by the charming toy from which the book takes its title. As long as the gaily coloured little china horsemen ride to the tinkly music of the roundabout we are held by the uncomfortable atmosphere of the Hampstead house and its unpleasant tenants, but in his efforts to clear the whole thing up Dr. Wintringham unhappily loses both our interest and our belief.

HOSPITALS YEAR BOOK

OVER the years this annual[2] has won the trust of a familiar friend, and its readers will happily accept Mr. J. F. Milne's editorial report that no major changes have been made. The event of the year for hospital administration was, of course, the Guillebaud report, and Mr. Milne is not surprised that the committee were "inevitably driven to conclude that we ought to be spending more and not less than we are doing on the service." He points out that at our present rate it will take us over a hundred years to replace our hospitals, too many of which are already obsolescent.

University of Cambridge

On Dec. 1 the following degrees were conferred by proxy:

M.D.—F. H. Epstein.
M.Chir.—D. A. Bailey.
M.B., B.Chir.—D. J. El Kabir.

1. China Roundabout. JOSEPHINE BELL. London: Hodder & Stoughton. 1956. Pp. 223. 12*s.* 6*d.*
2. Hospitals Year Book 1957. Institute of Hospital Administrators, 75, Portland Place, London, W.1. 1956. Pp. 1132. 52*s.* 6*d.*

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty on Dec. 3, with Prof. Stanley Alstead, the president, in the chair, the following were admitted to the fellowship:

J. S. Beck, Alexander Smith, J. M. J. Supramaniam.

University College of the West Indies

At a recent examination held at this university college by the University of London the following were successful:

M.B., B.S.—D. E. R. Luck (honours); E. G. Young, John Chin Ping Fai, E. E. De Pass, C. W. Greenidge, S. M. Luck, John McNeil, C. G. Miller, A. E. Wainwright, D. M. Wildish, Ruby B. V. Lake.

Royal Society of Medicine

Nichols Fellowship.—Applications for this grant of £225 per annum in aid of research in obstetrics and gynæcology should be sent to the secretary of the society, 1, Wimpole Street, London, W.1, by May 13.

British Association of Forensic Medicine

At a meeting of this association on Nov. 24, with Prof. John Glaister in the chair, the following officers were elected:

President-elect, Dr. Francis Camps; secretary, Dr. Donald Teare (St. George's Hospital, London, S.W.1); and treasurer, Dr. Gilbert Forbes.

Royal College of Midwives

The college has received £10,000 from the Nuffield Provincial Hospitals Trust to be used as an educational trust. The college has raised £83,000 towards the appeal for £150,000 which it launched some months ago.

National Health Service Superannuation Scheme (England and Wales)—A revised edition of this explanatory booklet is on sale at H.M. Stationery Office (1*s.*).

CORRIGENDUM: *Humidifier for Patients Breathing Spontaneously.*—In the description of this apparatus (*Lancet*, Dec. 1, 1956, p. 40) the address of the makers should read Messrs. Owen Mumford, Green Place, Abingdon Road, Oxford.

Diary of the Week

DEC. 16 TO 22

Monday, 17th

HUNTERIAN SOCIETY
8.30 P.M. (Talbot Restaurant, London Wall, E.C.2.) Prof. W. W. Mushin, Mr. H. C. Edwards: Advances in Anæsthesia—Real or Apparent?

Tuesday, 18th

INSTITUTE OF DERMATOLOGY, Lisle Street, London, W.C.2
5.30 P.M. Dr. Arthur Tickner: Fats and the Skin.

Wednesday, 19th

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
5 P.M. *Comparative Medicine.* Mr. A. B. Paterson, PH.D., Dr. T. F. Jarman: Tuberculin Sensitivity.
8.15 P.M. *General Practice.* Dr. Katharina Dalton, Dr. G. J. V. Crosby, Mr. John Beattie: Aftermath of Hysterectomy and Oöphorectomy.
INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. A. D. Porter: Light Sensitivity.
ROYAL STATISTICAL SOCIETY
5.15 P.M. (London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) Prof. M. S. Bartlett, D.SC.: Measles Periodicity and Community Size.

Friday, 21st

ROYAL MEDICO-CHIRURGICAL SOCIETY OF GLASGOW
8.30 P.M. (Royal Faculty of Physicians and Surgeons.) Prof. G. Pontecorvo, F.R.S.: Alpine Plants.

Appointments

ELLENBOGEN, B. K., M.D. Lpool, M.R.C.P.: part-time consultant physician, Birkenhead and North Wirral hospital areas.
LADELL, W. S. S., M.B. Camb.: superintendent of medical division, Chemical Defence Experimental Establishment, Porton, Wilts.
LEWIS, E. C., M.B. Lond.: registrar, Mount Gold Orthopædic Hospital, Plymouth.
MCLEAN, MURIEL M., M.D. Aberd., M.R.C.P.E., D.C.H.: consultant pædiatrician based at Royal Alexandra Hospital, Rhyl.

Births, Marriages, and Deaths

BIRTHS

HOGARTH—On Dec. 2, to Harriette, wife of Dr. J. C. Hogarth—a daughter.

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	per cent.
Fat (by acid hydrolysis)	6.2
Protein (N x 6.25)	11.2
Carbohydrate	72.3
Mineral Matter	2.4
Fibre	0.8
Moisture	7.3
	per oz.
Vitamin D	600 I.U.
Vitamin B_1 (as Aneurin Hydrochloride)	0.22 mg.

	grm. per oz.
Fat (by acid hydrolysis)	1.76
Protein (N x 6.25)	3.18
Carbohydrate	20.50
	mg. per oz.
Iron	5.0
Calcium	120.0
Phosphorus	110.0
Trace Elements: Zinc	1.0
Copper	0.1
Manganese	0.1

Calories 114 per oz.

WHEAT

Scott's Baby Cereal-Wheat consists of wheat flour, malt extract, wheat germ, bone phosphate, calcium carbonate, dried yeast, salt, iron and ammonium citrate, manganese sulphate and calciferol (Vitamin D.)

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Fat (by acid hydrolysis)	2.0
Protein (N x 6.25)	14.0
Carbohydrate	72.5
Mineral Matter	2.6
Fibre	0.4
Moisture	8.5
	per oz.
Vitamin D	600 I.U.
Vitamin B_1 (as Aneurin Hydrochloride)	0.17 mg.

	grm. per oz.
Fat (by acid hydrolysis)	0.57
Protein (N x 6.25)	3.98
Carbohydrate	20.59
	mg. per oz.
Iron	5.0
Calcium	120.0
Phosphorus	100.0
Trace Elements: Zinc	0.5
Copper	0.1
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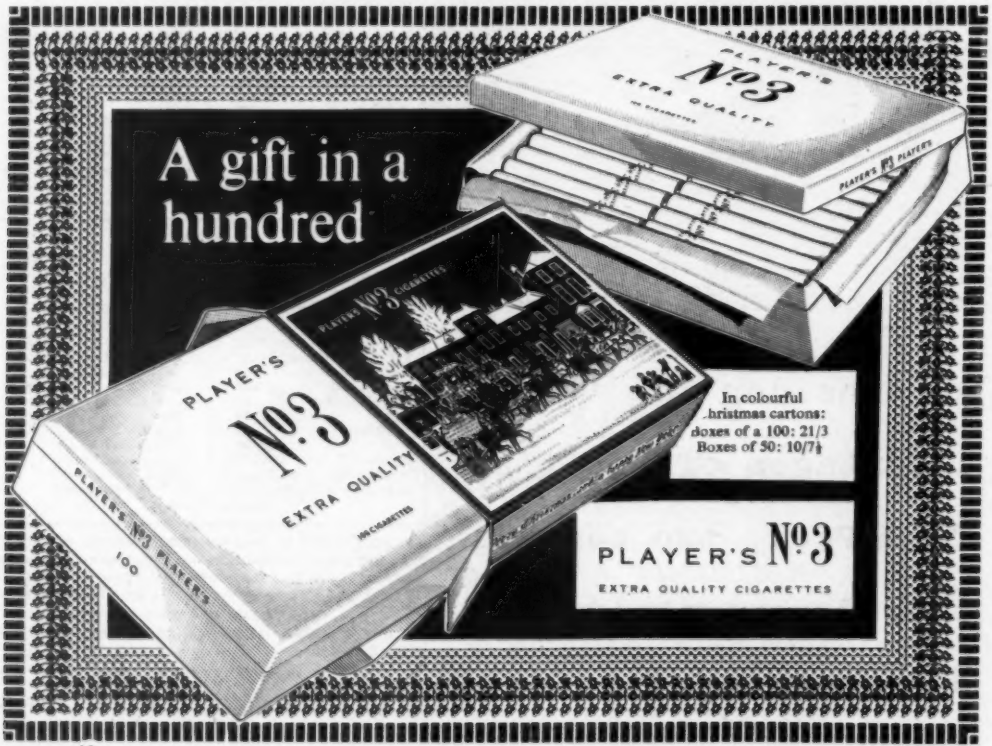

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See Lancet, July 22, 1899, p. 219

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See Lancet, May 7, 1932, p. 992

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FINAL F.R.C.S.—MAY, 1957

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Applications to the Sub-Dean, St. Bartholomew's Hospital Medical College, West Smithfield, E.C.1.

THE UNIVERSITY OF MANCHESTER. Applications are invited for the full-time post of LECTURER IN NEURO-SURGERY. Salary on a scale rising to £2000 p.a. according to qualifications and experience. Duties to commence as soon as possible. The successful applicant will be required to work in the Department of Neurosurgery in the Manchester Royal Infirmary, and the Board of Governors of the United Manchester Hospitals may be prepared to negotiate an honorary contract (ungraded) with the person appointed.

Applications should be sent not later than 31st December, 1956, to the Registrar, the University, Manchester, 13, from whom further particulars and forms of application may be obtained.

THE UNIVERSITY OF SHEFFIELD. A Graduate, with suitable training in physiology, biochemistry, pharmacology or chemistry, is required to assist in research in the Department of Pharmacology and Therapeutics, on the effect of drugs on gastric function. Salary in the range of £550–£750, depending on qualifications and experience. The appointment will be for 1 year initially, renewable for a further 2 years.

Applications, with details of age, qualifications and experience and the names and addresses of 2 referees, should be sent to the Registrar by 12th January, 1957.

UNIVERSITY OF THE WITWATERSRAND, Johannesburg, SOUTH AFRICA, AND THE TRANSVAAL PROVINCIAL ADMINISTRATION. Applications are invited for appointment to the joint staff of the University and the Johannesburg Hospital as PROFESSOR OF SURGERY AND CHIEF SURGEON. Duties are to be assumed as soon as possible. The salary attached to the appointment is £2700 p.a., with cost-of-living allowance in certain circumstances. Membership of the Provident Fund is compulsory and involves a contribution at the rate of 7% of the salary.

Applicants are advised to obtain a copy of the information sheet relating to this vacancy from the Secretary, Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1. Applications close, in South Africa and London, on 31st January, 1957.

Hospital Services : Senior Appointments

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

(1) Royal London Homœopathic Hospital, Great Ormond-street, W.C.1. (183 Beds.)

2 vacancies (SENIOR HOSPITAL MEDICAL OFFICER), each for 2 half-days a week, exist on the medical staff of this Hospital. Candidates should be Fellows or Members of the Faculty of Homœopathy. Hospital may be visited by direct appointment.

Applications before 14th January, 1957.

(2) ASSISTANT CHEST PHYSICIAN (whole-time), Senior Hospital Medical Officer grade, Hounslow Chest Clinic, 28, Bell-road, Hounslow, Middlesex. Associated with the Clinic are 26 Beds in Ashford Hospital, and 35 in West Middlesex Hospital. Candidates should have good general medical experience and special experience in treatment of tuberculosis and diseases of the chest. Clinic may be visited by direct appointment.

Applications before 21st January, 1957.

(3) ASSISTANT PSYCHIATRIST (whole-time), Senior Hospital Medical Officer grade, Hill End Hospital, St. Albans (647 Beds). Encouragement given to research. House available or accommodation available for single candidate. Hospital may be visited by direct appointment.

Applications before 23rd January, 1957.

(4) ASSISTANT CHILD PSYCHIATRIST (Senior Hospital Medical Officer grade), 2 half-days a week (1 day), Hertfordshire Child Guidance Service. Candidates may visit by appointment with the Medical Director, Hill End Child Guidance Clinic, Hill End Hospital, St. Albans.

Applications before 25th January, 1957.

Application forms obtainable from, and returnable to, Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Whole-time CONSULTANT PSYCHIATRIST at Springfield Hospital, S.W.17 (2000 Beds, including male and female neurosis units). The appointment includes both intramural and extramural duties. Candidates should have D.P.M., and a higher medical qualification and have had extensive experience in all branches of psychiatry. Resident quarters available for a single person.

Applications by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 12th January, 1957. Applicants may visit Hospital by local arrangement.

WESTMINSTER HOSPITAL, St. John's-gardens, S.W.1. Applications are invited for the appointment of SENIOR HOSPITAL MEDICAL OFFICER to the Ophthalmic Department. The appointment is for 7 notional half-days and the terms and conditions of service of hospital medical and dental staffs (Senior Hospital Medical Officer) will apply. Canvassing of members of the Board or of the Advisory Appointments Committee will lead to disqualification.

Applications (12 copies), with the names of 3 referees, should be sent to the House Governor and Secretary by 12th January, 1957.

BRIGHTON. SUSSEX EYE HOSPITAL. Part-time Locum CONSULTANT in Ophthalmology. Applications are invited from suitably qualified and experienced practitioners to fill a post as part-time Ophthalmologist at the above Hospital (5 sessions a week) from 7th January, 1957, for about 4–5 months.

Applications should be sent immediately to the Group Secretary, Brighton and Lewes Hospital Management Committee, Royal Sussex County Hospital, Brighton, 7 (Brighton 29155), from whom further particulars may be obtained.

CROYDON GROUP PATHOLOGICAL LABORATORIES. Locum PATHOLOGIST (Consultant or Senior Hospital Medical Officer), full-time, required at above Laboratories. Tenancy several weeks.

Applications to— G. A. PAINES, Group Secretary, Hospital Management Committee.

General Hospital, London-road, Croydon.

LEEDS REGIONAL HOSPITAL BOARD.

Whole-time Locum SENIOR HOSPITAL MEDICAL OFFICER in Chest Diseases for an initial period of 3 months for duties at Killingbeck Hospital, Leeds, with regular outpatient clinics at Morley and Carforth. Accommodation may be made available.

Whole-time Locum ASSISTANT ORTHOPÆDIC SURGEON (Senior Hospital Medical Officer scale)—Dewsbury and Leeds.

Whole-time Locum CONSULTANT or SENIOR HOSPITAL MEDICAL OFFICER in Psychiatry required for duties at Broadgate Hospital, Beverley, for an initial period of 3 months.

Applications, stating age, qualifications and details of appointments held showing dates, together with the names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, as soon as possible.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. LIVERPOOL REGIONAL HOSPITAL BOARD. THE UNIVERSITY OF LIVERPOOL. Applications are invited for a joint appointment as CONSULTANT PSYCHIATRIST (child psychiatry) (for 7 notional half-days) to The United Liverpool Hospitals and the Liverpool Regional Hospital Board, and LECTURER in Child Psychiatry in the Department of Studies in Psychological Medicine of the University of Liverpool. The appointment is for 3 notional half-days a week for duty in The United Liverpool Hospitals, in the first instance as Consultant in charge of the Department of Psychiatry in the Royal Liverpool Children's Hospital, and for 4 notional half-days a week for duty with the Liverpool Regional Hospital Board, in the first instance at Alder Hey Children's Hospital. In the University Department duties will be in connection with the undergraduate and post-graduate courses in psychological medicine and the person appointed will be remunerated for these by the University at the rate of £200 p.a. Candidates must possess a registrable qualification, and the M.D. of a University of the British Commonwealth or M.R.C.P. (London, Edinburgh or Ireland), and a special qualification in psychiatry.

Applications, giving full particulars of age, qualifications and details of present and previous appointments, together with the names of 3 persons to whom reference may be made, should reach the Secretary (from whom further particulars may be obtained), The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1, by 7th January, 1957.

NEWCASTLE REGIONAL HOSPITAL BOARD. Assistant PSYCHIATRIST (Senior Hospital Medical Officer), whole-time, resident, at St. George's Hospital, Morpeth (1250 Beds). Candidates should normally hold a D.P.M. but applications will be considered from candidates with no previous practical experience in psychiatry who hold a higher qualification, have had wide experience in general medicine, including Senior Registrar posts, and intend to obtain a D.P.M. and specialise in psychiatry. Full particulars from Regional Psychiatrist.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

NORTH GLOUCESTERSHIRE CLINICAL AREA. SOUTH-WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a CONSULTANT RADIOTHERAPIST to the North Gloucestershire Clinical Area which comprises Gloucester, Cheltenham, Stroud, Forest of Dean and adjoining districts. The appointment will be on a part-time basis (6 sessions). The successful candidate will be required to work mainly at the Gloucestershire Royal Hospital, Gloucester, and at Cheltenham General, Eye and Children's Hospital ; he may also be required to visit other hospitals in the Region as determined by the Regional Board from time to time.

Applications (12 copies), stating date of birth, qualifications and experience, together with the names and addresses of 2 referees, should be sent to the Secretary of the Regional Hospital Board, 27, Tyndalls Park-road, Bristol, 8, not later than 5th January, 1957.

OXFORD REGIONAL HOSPITAL BOARD. Consultant OBSTETRICIAN AND GYNÆCOLOGIST (part-time for 1 session a week) to the Aylesbury/High Wycombe Area Department with duties at Gerrards Cross Hospital (a general practitioner hospital of 36 Beds).

Applications (10 copies), stating age, qualifications, experience, and the names of 3 referees, should reach the Secretary, 43, Banbury-road, Oxford, by 5th January, 1957.

OXFORD REGIONAL HOSPITAL BOARD. Assistant RADIOTHERAPIST (Senior Hospital Medical Officer grade) whole-time for the Northampton Area Department of Radiotherapy. Candidates should be in possession of the D.M.R.(T.) and have had experience in radiotherapy. The department at Northampton General Hospital may be visited by arrangement with the Medical Director.

Applications (12 copies), giving age, qualifications, experience, and naming 3 referees, to reach the Secretary, Oxford Regional Hospital Board, 43, Banbury-road, Oxford, by 31st January, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Whole-time BACTERIOLOGIST (Senior Hospital Medical Officer grade) to the Edinburgh Northern Group of hospitals based on the Northern General Hospital, vacant on 1st March, 1957.

Apply, with particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th January.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for a Part-time CONSULTANT post (9 notional half-days) in Dermatology, with small amount of V.D. work.

Schedules of application and further particulars are obtainable from the undersigned, with whom applications should be lodged by 5th January, 1957. A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.
Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer grade), at Craig Dunain Hospital, Inverness. House available.

Forms of application and further particulars may be obtained from the undersigned with whom applications should be lodged by 21st January, 1957. A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.
Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the full-time post of DEPUTY PHYSICIAN-SUPERINTENDENT, Kingseat Hospital, Newmachar Aberdeenshire. The post is of Consultant status and the officer appointed will be required to take part in the Psychiatric Service of the Region. Residential accommodation is available at Kingseat Hospital.

Applications (12 copies), together with the names of 2 referees, should be submitted by 22nd December, 1956, to the Secretary, 1, Albyn-place, Aberdeen, from whom further particulars of the appointment may be obtained.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments :—

2 CONSULTANT PHYSICIANS in charge of wards, Southern General Hospital, Glasgow.

CONSULTANT SURGEON in charge of wards, Stobhill General Hospital, Glasgow.

CONSULTANT SURGEON in charge of wards, Stobhill General Hospital, Glasgow. 1 of the wards is concerned with surgical pædiatrics and the appointment will be associated with University teaching duties in surgical pædiatrics.

CONSULTANT SURGEON, Western Infirmary, Glasgow.

These appointments will be on the part-time basis of 7 notional half-days per week and are subject to the National Health Service (Scotland) superannuation regulations.

Applications (16 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, not later than 30 days after the publication of this advertisement.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment (whole-time or maximum part-time) of CONSULTANT in Physical Medicine to the Isle of Thanet Group of hospitals. The duties include clinical supervision and a small amount of medical administration of the 250 Beds at Princess Mary's Hospital (Rehabilitation), Wilderness Hill, Margate. Candidates should have had considerable experience in the specialty. A higher qualification in medicine is essential and the appropriate diploma is desirable. Applicants may visit the hospitals concerned.

Apply, stating nationality, age, sex, qualifications, and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to the Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 5th January, 1957.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE. Locum ASSISTANT CHEST PHYSICIAN (Senior Hospital Medical Officer) or Locum REGISTRAR. Post available as from 1st January, 1957. Duties include work at 2 busy chest clinics and opportunities to gain experience in Thoracic Surgical Unit.

Applications, with names of 2 referees, to Secretary, Knowsley House, Wigan.

CANADA. REGINA GENERAL HOSPITAL, Regina, SASKATCHEWAN. Vacancy for CLINICAL PATHOLOGIST in active 800-Bed General Hospital.

Reply to Director of Laboratories, Regina General Hospital, Regina, Saskatchewan, Canada.

Hospital Services : Junior Appointments

BETHNAL GREEN HOSPITAL, Cambridge Heath-road, London, E.2. HOUSE SURGEON (pre-registration) required, immediate vacancy.

Applications, with 2 testimonials, to Hospital Secretary.

BROOK GENERAL HOSPITAL, Shooters Hill, Woolwich, S.E.18. SENIOR HOUSE OFFICER (Infectious Diseases Unit), vacant 1st January. This Unit provides excellent experience and is 1 of the Regional Centres for the treatment of bulbar poliomyelitis. The appointment is expected to include pædiatrics, with the opening of a new ward early in 1957.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR required in X-ray Department. Whole-time, non-resident appointment for 1 year in first instance, under supervision of Consultant, will include teaching and some work in Mass X-ray Department. Possession of diploma desirable. Post vacant January, 1957. Hospital may be visited by direct appointment. Salary £850 p.a. in first year, £965 p.a. in the second year. Subject to terms and conditions of service of hospital medical and dental staffs.

Application forms from, and returnable to, Group Secretary, Central Middlesex Group Hospital Management Committee, Park Royal, N.W.10, by 31st December, 1956.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. HOUSE SURGEON (pre-registration) required on 9th January, 1957.

Applications, stating age, nationality, qualifications and experience, with the names of 3 recent referees, should be sent to the Secretary not later than 29th December.

DULWICH HOSPITAL, East Dulwich-grove, S.E.22. Applications invited for appointment as SENIOR HOUSE OFFICER (pathology). Resident post for 6 months in first instance.

Apply, giving age, qualifications and previous posts with copy testimonials or names of 2 referees, to Group Secretary, Dulwich Hospital not later than 31st December.

HENDON ISOLATION HOSPITAL, Goldsmith-avenue, London, N.W.9. (92 infectious diseases beds and 20 gynæcological beds.) JUNIOR HOSPITAL MEDICAL OFFICER (resident) required at above Hospital. Previous similar experience essential.

Apply, stating age, nationality, qualifications and experience, to Group Secretary, Edgware General Hospital, Edgware, Middlesex, by 29th December, 1956.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. HOUSE PHYSICIAN, vacant 7th January, 1957. Preference given to applicants seeking pre-registration post under Medical Act, 1950.

Applications, with copies of 3 testimonials and name and address of 1 referee, to Hospital Secretary.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. HOUSE SURGEON required, vacant 18th January, 1957. Duties mainly orthopædic with some E.N.T. and emergency general surgery. New operating theatre, Outpatient and Casualty Department. Preference given to applicant seeking pre-registration post under Medical Act, 1950.

Applications, with copies of 3 testimonials, and name and address of 1 referee, to Hospital Secretary.

HOSPITAL OF ST. JOHN AND ST. ELIZABETH, 60, Grove End-road, London, N.W.8. Applications are invited from pre-registration or registered medical practitioners (Male) for the appointment of HOUSE PHYSICIAN, to become vacant on Wednesday, 16th January, 1957. Appointment will be for a period of 6 months. National Health Service salary.

Applications to reach the Secretary on or before Saturday, 29th December, 1956, together with copies of 3 recent testimonials.

KING EDWARD MEMORIAL HOSPITAL, Ealing. HOUSE OFFICER in Gynæcology with some obstetric duties at Perivale Maternity Hospital, Greenford. Pre-registration surgical post, vacant 1st January. Preference given to persons seeking second pre-registration post under Medical Act, 1950.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, Middlesex, by 21st December.

LAMBETH HOSPITAL, Kennington, S.E.11. Applications are invited from pre-registration and registered medical practitioners for the position of RESIDENT HOUSE SURGEON, vacant 23rd January, 1957. The successful candidate will be required to carry out a fortnight's locum duty starting 9th January, 1957.

Application forms from the Physician-Superintendent. A stamped addressed envelope should be enclosed.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited for appointment as CASUALTY OFFICER, vacant 1st February, 1957. The successful candidate will be required to carry out locum duties from 14th January, 1957. The post is graded as Senior House Officer or House Officer, according to experience, and is recognised for the F.R.C.S.

Application forms from the Physician-Superintendent. A stamped addressed envelope should be enclosed.

LONDON CHEST HOSPITAL. 2 vacancies occur 1st February, 1957, for RESIDENT HOUSE PHYSICIAN. Appointment for 6 months, 4 in London, 2 at the Country Branch, near Letchworth, and post graded as House Officer. Duties include work in the Outpatient Department and Refill Clinic, as well as in wards.

Applications, stating date of birth, qualifications with dates, and previous appointments held, with copies of 3 testimonials, should reach the undersigned not later than 18th December, 1956.
THOMAS BROWN, House Governor.
London Chest Hospital, E.2.

LONDON JEWISH HOSPITAL, Stepney Green, E.1. (130 Beds.) HOUSE SURGEONS (pre- or post-registration). Posts vacant : (*a*) immediately, (*b*) 3rd January, 1957.

Applications, stating age, experience, &c., and copies of testimonials, to be sent to the Hospital Secretary.

LONDON JEWISH HOSPITAL, Stepney Green, E.1. (130 Beds.) HOUSE PHYSICIAN (pre- or post-registration). Post vacant 5th January, 1957.

Applications, stating age, experience, &c., and copies of testimonials, to be sent to the Hospital Secretary.

MILDMAY MISSION HOSPITAL, Austin-street, London, E.2. Applications are invited for the pre-registration post of RESIDENT HOUSE PHYSICIAN AND CASUALTY OFFICER, vacant 16th January, 1957. Salary £425, £475, or £525 p.a., according to experience, less £125 for residence. Candidates should be in sympathy with the evangelical aims of the Hospital and preference will be given to intending medical missionaries.

Applications and references to be addressed to the Medical Superintendent.

MILDMAY MISSION HOSPITAL, Austin-street, London, E.2. Applications are invited for the pre-registration post of RESIDENT HOUSE SURGEON, vacant 1st February, 1957. Salary £425, £475 or £525 p.a. according to experience, less £125 for residence. Candidates should be in sympathy with the evangelical aims of the Hospital and preference will be given to intending medical missionaries.

Applications and references to be addressed to the Medical Superintendent.

MIDDLESEX HOSPITAL, W.1. Applications invited for post of SENIOR OBSTETRIC AND GYNÆCOLOGICAL REGISTRAR with duties at The Middlesex Hospital and The Hospital for Women, Soho.

Rules and application forms obtainable from the Deputy Superintendent should be returned, naming 2 referees, by 5th January.

NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W.1. (158 Beds.) Applications are invited to fill the undermentioned posts :—

1 HOUSE PHYSICIAN (general), pre-registration post.

2 HOUSE SURGEONS (general), pre-registration posts.

Applications by post-registration candidates will also be considered.

Applications, stating age, qualifications and experience, together with names and addresses of 2 referees, to be sent to Hospital Secretary by 31st December.

NEW END HOSPITAL, Hampstead, N.W.3. Department OF ENDOCRINOLOGY. Applications are invited for the position of HOUSE PHYSICIAN (pre-registration), vacant 18th January, 1957.

Application forms obtainable from Group Secretary, 46, Cholmeley-park, N.6, and returnable to Surgeon-Superintendent, New End Hospital, by 27th December, 1956.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. SENIOR HOUSE OFFICER for Thoracic Surgical Unit, resident, required. 6 months appointment with possible extension to 1 year. Recognised for F.R.C.S. Offers experience in all types of tuberculous and non-tuberculous thoracic surgery.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials, and/or names of 2 referees, to Secretary of Hospital, by 28th December.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. SENIOR HOUSE OFFICER (pædiatrics), resident, required for 1st February, 1957. (Locum 18th–31st January.) Previous experience desirable. Post recognised for D.C.H. Appointment for 6 months in the first instance, with possible extension to 1 year.

Applications (in own handwriting), stating age, nationality, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital, by 28th December.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON (post-registration), resident, required for 1st February, 1957. Post recognised by R.C.O.G. for Diploma, and as a combined post for Membership. Candidates must have held house appointments in either medicine or surgery. Large Obstetric and Gynæcological Department.

Applications (in own handwriting), stating age, nationality, qualifications, experience, with copies of recent testimonials, to Secretary of Hospital, by 28th December.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. Applications are invited from pre-registration and registered medical practitioners for the post of RESIDENT HOUSE SURGEON (general surgery). 6 months appointment, vacant 1st February, 1957. Recognised for F.R.C.S.

Applications (in own handwriting), stating age, nationality, qualifications, experience, with copies of recent testimonials, to Secretary of Hospital, by 28th December.

PADDINGTON/KENSINGTON CHEST CLINIC, 14/18, Newton-road, W.2. Applications are invited for the post of Whole-time REGISTRAR (non-resident). Duties include work at the Chest Clinic and St. Charles' Hospital, Ladbroke-grove, W.10. A good general medical background with some specialised knowledge in the diagnosis and treatment of diseases of the chest is desirable. Clinic and Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary to Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 31st December, 1956.

PLAISTOW HOSPITAL, Samson-street, London, E.13. Applications are invited for appointment of SENIOR HOUSE OFFICER (resident) to the Chest Unit and Infectious Diseases Unit at the above Hospital for 12 months from 30th January, 1957. Previous experience in diseases of the chest is desirable. Excellent experience is afforded in the investigation of chest and infectious diseases cases and there are good facilities for post-graduate study for the M.R.C.P. examination.

Applications, with copies of recent testimonials, to M. J. HUNTLEY, Group Secretary, West Ham Group Hospital Management Committee, Stratford, London, E.15, by 19th December, 1956.

ROYAL EYE HOSPITAL, S.E.1. Lambeth Group Hospital MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER from January to 31st March pending an appointment being made on 1st April, 1957.

Applications, together with copies of recent testimonials, should be made to the Secretary, Royal Eye Hospital, St. George's-circus, S.E.1, as soon as possible.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1, and **BROCKLEY HILL, STANMORE, MIDDLESEX.** Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (3 vacancies) for a period of 6 months. 1 to commence duties at Great Portland-street on 8th March, 1957 ; 2 to commence duties at the Country Hospital, Stanmore, on 17th February, 1957, and 20th March, 1957, respectively.

Applications to be received by 31st December, 1956. Forms of application can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, S.W.4. Locum RESIDENT MEDICAL OFFICER (Woman practitioner), Senior House Officer grade, required for 2 weeks from 12th January, 1957, at the above Hospital.

Applications to Hospital Secretary.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, S.W.4. REGISTRAR in Pathology (full-time). Applications are invited from Women medical practitioners who should have had experience of laboratory work. Canvassing will disqualify but candidates are not precluded from visiting the Hospital if they so desire.

Form of application (enclosing stamped addressed envelope) from the Secretary, Lambeth Group Hospital Management Committee, Renfrew-road, S.E.11, to whom completed applications should be returned not later than 29th December, 1956.

SOUTH WESTERN HOSPITAL, Landor-road, S.W.9. LAMBETH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited (preferably from Women candidates) for the post of HOUSE SURGEON (pre-registration) at the above Hospital. Duties include general surgery and the successful applicant will also be required to provide relief for leave of the House Surgeon at the Annie McCall Maternity Hospital.

Application forms can be obtained from the Secretary.

ST. ANDREW'S HOSPITAL, Devons-road, Bow, E.3. SENIOR HOUSE OFFICFR in Pathology (resident or non-resident) required at above Hospital. No previous experience necessary. Training in all branches of pathology available. Appointment for 1 year in the first instance. Post vacant on 1st January, 1957.

Applications to Group Secretary, Bow Group Hospital Management Committee, 2A, Bow-road, E.3.

ST. GEORGE'S HOSPITAL, S.W.1, and WINCHESTER AND SOUTHAMPTON GROUPS OF HOSPITALS. Applications are invited for the post of REGISTRAR to the Department of Pædiatrics. The successful candidate will work jointly between St. George's Hospital Children's Department at the Victoria Hospital for Children and the Winchester and Southampton Groups of hospitals. Candidates should have had good experience of work in a Children's Hospital and should hold the D.C.H. Membership of the Royal College of Physicians would be an advantage. The appointment will be for 1 year in the first instance and the successful candidate will be required to take up duty as soon as possible after 1st February, 1957.

Applications, stating age, education, qualifications and experience, together with the names of 2 referees, should reach the undersigned not later than 31st December, 1956.

P. H. CONSTABLE, House Governor.

St. George's Hospital.

ST. JAMES' HOSPITAL, Balham, London, S.W.12. SENIOR HOUSE OFFICER (pædiatrics) with at least 6 months pædiatric experience. Vacant 14th January. Post recognised for D.C.H.

Applications, stating age, qualifications, experience and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, at above address by 3rd January, 1957. (0115.)

ST. LEONARD'S HOSPITAL, Nuttall-street, London, N.1. (Acute General—192 Beds.) Applications are invited from registered or provisionally registered medical practitioners for the post of HOUSE SURGEON. Post vacant 2nd January, 1957.

Applications, with copies of 2 testimonials, to the Hospital Secretary by 22nd December, 1956.

ST. LEONARD'S HOSPITAL, Nuttall-street, N.1. (Acute General—192 Beds.) Applications are invited from registered or provisionally registered medical practitioners for the post of HOUSE PHYSICIAN for 6 months, commencing 1st January, 1957.

Applications, with 2 recent testimonials, to the Hospital Secretary by 22nd December, 1956.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited for the post of SENIOR REGISTRAR in Anæsthetics. F.F.A.R.C.S. essential. The appointment is for a first period of 12 months as from a date to be arranged.

Applications, stating nationality, date of birth, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 2nd January, 1957.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited for the post of Whole-time ANÆSTHETIC REGISTRAR. Candidates should possess the D.A. The appointment is for a first period of 12 months as from a date to be arranged.

Applications, stating nationality, date of birth, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 2nd January, 1957.

ST. MARY'S HOSPITAL, W.2, and NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. (PADDINGTON GENERAL HOSPITAL.) Applications are invited for the post of Part-time REGISTRAR to the E.N.T. Department. The successful candidate will be required to undertake, as soon as possible, 8 sessions per week as follows :—

5 notional half-days—St. Mary's Hospital and Paddington Green Children's Hospital.

3 notional half-days—Paddington General Hospital.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, St. Mary's Hospital, W.2, not later than 27th December, 1956.

ST. THOMAS'S HOSPITAL, London, S.E.1. Obstetric HOUSE PHYSICIAN at the General Lying-in Hospital, York-road, S.E.1, for a period of 6 months from 5th March, 1957. Resident. Approved service for M.R.C.O.G.

Applications, from fully registered medical practitioners only, to the Clerk of the Governors, by 28th December, 1956, naming 2 referees.

ST. THOMAS'S HOSPITAL, London, S.E.1. Senior REGISTRAR to the Skin Department for a period of 1 year in the first instance.

Applications, naming 2 referees, to the Clerk of the Governors by 28th December, 1956.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There is a vacancy for a RESIDENT ASSISTANT PHYSICIAN (grade Senior Registrar).

Full particulars and form of application which must be returned not later than 14th January, 1957, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be a vacancy in February, 1957, for a MEDICAL REGISTRAR AND PATHOLOGIST (Senior Registrar). In September, 1958, the successful candidate will probably be seconded to Uganda to work in paediatrics for a period of 2 years in the Great Ormond-street Liaison Scheme under the Uganda Medical Service, after this period he will return to Great Ormond-street for a further year.

Full particulars and form of application, which must be returned not later than Monday, 14th January, 1957, may be obtained from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. Applications are invited for the posts of SENIOR REGISTRAR to the Skin Department, which will be vacant in February, 1957. Attendances will be required on Thursday afternoons.

Further particulars and form of application which must be returned not later than 14th January, 1957, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

WESTMINSTER HOSPITAL, St. John's Gardens, S.W.1. Applications are invited for post of SENIOR REGISTRAR to Radiological (Diagnostic) Department for 1 year in first instance from 1st February, 1957.

Applications (10 copies), with names of 2 referees, to House Governor by 29th December.

WHIPPS CROSS HOSPITAL, London, E.11. Applications are invited for the post of Pre-registration HOUSE SURGEON (general surgery) which becomes vacant 1st January, 1957.

Application forms from the Hospital Secretary to be returned by 21st December, 1956.

WHIPPS CROSS HOSPITAL, London, E.11. Applications are invited for the post of Pre-registration HOUSE PHYSICIAN (general medicine) which becomes vacant 31st January, 1957.

Application forms from the Hospital Secretary to be returned by 4th January, 1957.

WILLESDEN GENERAL HOSPITAL, Harlesden-road, N.W.10. RESIDENT HOUSE PHYSICIAN wanted 17th January, 1957, plus 14 days Locum from 4th January, 1957. Pre-registration candidates eligible.

Apply Hospital Secretary, by 19th December, 1956.

WILLESDEN GENERAL HOSPITAL, Harlesden-road, N.W.10. RESIDENT CASUALTY OFFICER (Senior House Officer grade) required 7th January, 1957. 6 months appointment. Post recognised under Fellowship regulations.

Applications, with full particulars and references, to Hospital Secretary, by 27th December, 1956.

ABERDEEN SPECIAL HOSPITALS BOARD OF MAN-AGEMENT. 1 HOUSE OFFICER (pre- or post-registration) required for the period 1st February–31st July, 1957. The post offers experience mainly in eye and skin conditions and is classified for pre-registration purposes as quasi-medical.

Applications, with full details, to Group Medical Superintendent, Royal Aberdeen Hospital for Sick Children, Westburn-drive, Aberdeen.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDE-VILLE HOSPITAL. (619 Beds.) RESIDENT HOUSE PHYSICIAN for the Neurological Unit (a part of the Department of Neurology of the United Oxford Hospitals), vacant 25th January, 1957. Recognised pre-registration post, also open to registered practitioners, in which case status up to Senior House Officer may be awarded.

Applications, with copies of 2 testimonials, to the Administrative Officer.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGE-MENT COMMITTEE. HOUSE OFFICER (midwifery) required. Post recognised for D.Obst.R.C.O.G., vacant 27th January, 1957. Preference given to pre-registration candidates.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGE-MENT COMMITTEE.

2 HOUSE PHYSICIANS required at Ashton-under-Lyne General Hospital. 1 post vacant end of January, 1 vacant mid-February. Preference given to pre-registration candidates.

SENIOR HOUSE OFFICER (obstetrics/gynæcology) required at Ashton-under-Lyne General Hospital. Bed complement 82 obstetric and 26 gynæcology. Recognised for M.R.C.O.G. Vacant 3rd February, 1957.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

BARKING HOSPITAL (Maternity), Upney-lane, Barking. There will be a vacancy for a RESIDENT SENIOR HOUSE OFFICER at the above Hospital on 1st January, 1957. Salary will be at the rate of £745 p.a., less emoluments. Applicants should have been qualified not less than 1 year. Duties will include antenatal work.

Applications, accompanied by copies of testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary, Ilford
and Barking Group Hospital Management Committee.
King George Hospital, Ilford.

BARNSLEY. BECKETT HOSPITAL. (174 Beds. Recog-nised for the F.F.A.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (anæsthetics) required, with duties also at St. Helen Hospital, Barnsley (225 Beds). Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

BARNSTAPLE. NORTH DEVON INFIRMARY. (105 Beds.) HOUSE SURGEON (pre-registration). Post vacant early January.

Applications to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple.

BATH. ST. MARTIN'S HOSPITAL. Applications are invited from medical practitioners for 2 HOUSE SURGEON posts at above Hospital. The posts are recognised for pre-registration purposes.

Applications, stating age, qualifications and experience, should be sent to the Group Secretary, Bath Hospital Management Committee, Manor Hospital, Combe Park, Bath, accompanied by 3 testimonials.

BEDFORD (near). BROMHAM HOSPITAL. (434 Beds for mental defectives and 60 at Annexe near Sandy.) REGISTRAR in Psychiatry required (resident). Hospital may be visited by direct appointment with the Medical Superintendent (phone : Oakley 295).

Application forms obtainable from, and returnable to, Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BEDFORD GENERAL HOSPITAL. (439 Beds.) House SURGEON required. Pre- or post-registration. Recognised for F.R.C.S. Post offers exceptional opportunities for general experience in busy acute Surgical Units.

Inquiries and applications, with copies of 2 recent testimonials, to Group Secretary, 3, Kimbolton-road, Bedford.

BIRMINGHAM ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. (215 Beds and 8 House Surgeons.) HOUSE SURGEON (resident), pre-registration post vacant 23rd January, 1957. Recognised for purpose of casualty by R.C.S.(Eng.). Teaching programme by Consultant staff. Appointment for 6 months, some of which may be spent at applicant's request in 42-Bedded Medical Research Council's Burns Unit.

Apply, naming 2 referees, to Administrator within 7 days of this advertisement.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) Birmingham Group 25, Oak Tree-lane, Birmingham, 29

SURGICAL REGISTRAR. Special experience available in treatment of shock, infection and principles of plastic surgery in connection with M.R.C. Burns Unit. Previous experience not essential. F.R.C.S. advantageous.

(2) South Warwickshire Group, 50, Holly-walk, Leamington Spa

REGISTRAR (general surgery), Warwick Hospital (320 Beds). Experience specialty desirable. Higher qualification an advantage. Recognised for F.R.C.S.

(3) Coventry No. 20 Group, Coventry and Warwickshire Hospital, Coventry

REGISTRAR (physical medicine), non-resident. Duties with Coventry Group of hospitals and Warneford Hospital, Leamington Spa.

Application forms from Group Secretaries, to be returned by 24th December, 1956.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. HOUSE SURGEON (Male/Female). Recognised as pre-registration appointment.

Apply Physician-Superintendent with copies of 2 testimonials or names of referees.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. HOUSE PHYSICIAN (Male/Female), vacant 12th January, 1957. Recognised as pre-registration appointment.

Apply Physician-Superintendent, with copies of 2 testimonials or names of referees.

BIRMINGHAM, 18. DUDLEY ROAD HOSPITAL. 3 HOUSE SURGEONS required. Recognised for pre-registration and F.R.C.S. Vacant 1st, 10th January and 1st February, 1957. Each appointment is in a unit of approximately 85 adult and children's general surgical beds under control of 2 Consultant Surgeons.

Detailed applications, with copies of 3 recent testimonials, to the Secretary.

BIDEFORD AND DISTRICT HOSPITAL. (51 Beds.) Applications invited for post of HOUSE OFFICER, now vacant. Flat available for married officer.

Applications, stating names of 2 referees, to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple.

BISHOP AUCKLAND, co. DURHAM. THE GENERAL HOSPITAL. (350 Beds.) HOUSE SURGEON required. Recognised pre-registration post.

Apply, naming 2 referees, to K. G. T. LUXFORD, Group Secretary, South West Durham Hospital Management Committee, at the above address.

BLACKBURN. QUEEN'S PARK HOSPITAL. (640 general beds.) BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required, post falling vacant on 19th January, 1957. Recognised for pre-registration purposes.

Apply to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BRENTWOOD, ESSEX. NORTH-EAST METROPOLITAN REGIONAL BLOOD TRANSFUSION CENTRE. JUNIOR HOSPITAL MEDICAL OFFICER required for full-time duties with mobile teams at donor sessions. Opportunity exists for training in blood transfusion serology. Salary £775–£50–£1075 p.a.

Applications, giving age, qualifications, experience and names of 2 referees, to the Director as soon as possible.

BRIGHTON GENERAL HOSPITAL. Brighton and LEWES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the position of HOUSE PHYSICIAN to the Geriatric Unit. This is a large Unit with an active rehabilitation section, which provides excellent clinical facilities. Vacant 1st February.

Applications, stating age, qualifications and experience, together with copies of recent testimonials, should be sent to the Physician-Superintendent, Brighton General Hospital, Elmgrove, Brighton, 7.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (312 Beds.) 2 CASUALTY HOUSE SURGEONS. Duties include work in Orthopædic and Traumatic Unit. Vacant mid-January and February. Recognised for pre-registration and F.R.C.S.

Applications, stating usual particulars, and naming 2 referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton.

BRISTOL AND COSSHAM/FRENCHAY HOSPITAL MANAGEMENT COMMITTEE. 2 SENIOR HOUSE OFFICERS required in the Thoracic Surgery Department, which is the Regional Thoracic Surgery Centre (120 Beds) for the South West.

Applications, with full particulars, should be addressed to the Group Secretary, Frenchay Hospital, Bristol, quoting "Thoracic."

BRISTOL. COSSHAM/FRENCHAY HOSPITAL MANAGEMENT COMMITTEE. FRENCHAY HOSPITAL. (542 staffed beds—expanding.) Vacancy shortly occurs for the post of SENIOR HOUSE OFFICER (Regional Department of Neurosurgery), tenable for 6–12 months. The post offers useful surgical experience and the opportunity of gaining a working knowledge of neurological diagnosis. Recognised for F.R.C.S.

Applications to the Secretary, Frenchay Hospital, quoting "N.S.F." Names of 2 referees required.

BRISTOL. SOUTHMEAD GENERAL HOSPITAL GROUP MANAGEMENT COMMITTEE. Required at Southmead Hospital (570 Beds, including 133 maternity) RESIDENT SENIOR HOUSE OFFICER (urological surgery) for 12 months commencing 1st January, 1957. Post recognised for F.R.C.S. examination.

Applications to be made on forms to be obtained from the undersigned. C. C. HANCOCK, Group Secretary.

Southmead Hospital, Bristol.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. GYNÆCOLOGICAL HOUSE SURGEON for 6 months from 1st February, 1957. Second or subsequent post. Recognised for Pre-registration Service and M.R.C.O.G.

Apply, stating age, nationality, qualifications and experience with dates, and copies of 3 testimonials, to Secretary by 29th December. Interviews early January.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. House PHYSICIAN for 6 months from 31st January. Recognised Pre-registration Service.

Apply, stating age, nationality, qualifications and experience with dates, and copies of 3 testimonials, to Secretary by 29th December. Interviews early January.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS, ADDENBROOKE'S HOSPITAL. RESIDENT SENIOR HOUSE OFFICER in Radiotherapy for 1 year. Post now vacant. Previous experience an advantage.

Apply, with full particulars and copies of 3 testimonials, to the Secretary, by 29th December.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) GYNÆCOLOGICAL HOUSE SURGEON required at Highland Court Annexe, a unit of 25 gynæcological beds situated 3 miles from the above Hospital, with all ancillary services available. Recognised for M.R.C.O.G. 6 months appointment. Post vacant early January, 1957. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF (near). ELY HOSPITAL. Whitchurch and ELY HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER. This post is available at above Hospital, a 500-Bedded mental deficiency hospital in close proximity of Cardiff. Salary £775–£50–£1075; conditions of service as prescribed by the Medical Whitley Council.

Applications, giving the names and addresses of 3 referees, to be sent to the Group Secretary, Group Office, Whitchurch Hospital, Cardiff.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL. (430 Beds.) Applications are invited for the post of SENIOR MEDICAL REGISTRAR. The Hospital may be visited by arrangement with Physician-Superintendent (Tel.: Ottershaw 441).

Application forms can be obtained from the Group Secretary, Woking and Chertsey Hospital Management Committee, "Huntington," Guildford-road, Chertsey. Closing date 29th December.

CHESTERFIELD ROYAL HOSPITAL. (324 Beds. Recognised for the D.A. and F.F.A.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (anæsthetics) with additional duties, when required, at other hospitals in the Group. Experience in all types of anæsthesia, except for neurosurgery, can be gained. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

COLCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for :—

Essex County Hospital, Colchester (185 Beds)

HOUSE OFFICER (surgical). First, second, third or pre-registration post, tenable for 6 months. Recognised for F.R.C.S.

Black Notley Hospital, Braintree (516 Beds)

Posts of HOUSE SURGEON and HOUSE PHYSICIAN. The successful applicant will serve 6 months as House Surgeon followed by 6 months as House Physician. First, second, third or pre-registration posts. Surgical post includes duties in general surgical and gynæcological wards. Recognised for F.R.C.S. Medical post includes duties in medical and pædiatric wards.

Applications, with copies of 3 testimonials, to Group Secretary, 14, Pope's-lane, Colchester.

CROYDON. MAYDAY HOSPITAL. (611 Beds.) **Obstetric** AND GYNÆCOLOGICAL HOUSE OFFICER (resident) required. Post is recognised for the M.R.C.O.G. and D.Obst.R.C.O.G. Preference will be given to those applicants who have held a House Surgeon post. Pre-registration candidates are also invited to apply. The post commences on 9th January, 1957.

Application forms obtainable from the undersigned.

G. A. PAINES, Group Secretary,
Hospital Management Committee.

General Hospital, London-road, Croydon.

DERBY. DERBYSHIRE CHILDREN'S HOSPITAL. (86 Beds.) HOUSE SURGEON (pre-registration) or SENIOR HOUSE OFFICER, vacant 29th January, 1957. Recognised for D.C.H.

Apply immediately, stating full particulars and 2 names for reference, to Group Secretary, No. 1 Hospital Management Committee, Babington-lane, Derby.

DERBY. DERBYSHIRE ROYAL INFIRMARY. (398 Beds. Hospital recognised for training for F.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT SURGICAL REGISTRAR required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DERBY. DERBYSHIRE ROYAL INFIRMARY. House SURGEON (general surgery). Pre-registration candidates eligible. Vacant 3rd January, 1957.

Apply, stating details with copies of 2 testimonials, to Secretary.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP. BIRMINGHAM REGION.

The Guest Hospital, Dudley (154 Beds)

SENIOR HOUSE OFFICER (surgical). Post now vacant.
SENIOR HOUSE OFFICER (casualty). Post vacant 1st January, 1957.
HOUSE OFFICER (medical), pre-registration. Post vacant January, 1957.
HOUSE OFFICER (surgical), pre-registration. Post vacant January, 1957.

The Corbett Hospital, Stourbridge (114 Beds)

HOUSE OFFICER (surgical), pre-registration. Post vacant January, 1957.

Apply, Group Secretary, Guest Hospital, Dudley.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. RESIDENT HOUSE SURGEON (approved pre-registration, first or second post), vacant 2nd February, 1957. Duties with a General Surgical Unit. Post recognised by the Royal College of Surgeons. 6 months appointment.

Applications, with names and addresses of 2 referees, to the Group Secretary, Enfield Group Hospital Management Committee, at Chase Farm Hospital, The Ridgeway, Enfield, Middlesex.

EPPING. ST. MARGARET'S HOSPITAL. Senior HOUSE OFFICER (pathology). Post vacant 1st January, 1957. Salary on national scale, less deduction for board, lodging, &c. Busy department in large general hospital with easy access to London.

Applications, with names of 2 referees, to the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, by 28th December, 1956.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom. RESIDENT HOUSE SURGEON required 19th January for Orthopædic, E.N.T. and Eye Departments. Pre-registration post.

Applications, stating age, qualifications, and experience, with copies of 2 recent testimonials, should be sent immediately to Group Secretary at above address.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. RESIDENT HOUSE SURGEON required 5th February. Pre-registration post recognised for F.R.C.S.

Applications, stating age, qualifications and experience with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

GLASGOW. BELVIDERE INFECTIOUS DISEASES HOSPITAL. JUNIOR HOUSE OFFICER (pre-registration). The appointment will be for 6 months from 1st February next and is a recognised pre-registration post in medicine.

Apply in writing, giving 2 names for reference, to the Medical Superintendent, Belvidere Infectious Diseases Hospital, London-road, Glasgow, E.1.

GLASGOW, N. FORESTHALL HOSPITAL. (640 hospital beds for long-term sick.) JUNIOR HOSPITAL MEDICAL OFFICERS (3 vacancies). Applicants must have been qualified for 2 years and have had experience as House Officers in general hospitals. The present establishment is for 5 Junior Hospital Medical Officers and they are encouraged to spend part of their time at a nearby teaching hospital to maintain their interest in general medicine. Facilities and supervision are also provided for medical officers wishing to pursue clinical research in preparation for higher degrees. Living in optional.

Applications, with the names of 3 referees, should be sent to the Administrative Medical Officer, Foresthall, 657, Edgefauld-road, Glasgow, N.

GLASGOW OPHTHALMIC INSTITUTION. Junior HOUSE OFFICER (pre-registration). The appointment will be for 6 months from 1st February next and is a recognised pre-registration post in surgery.

Apply in writing, giving 2 names for reference, to the Medical Superintendent, Glasgow Royal Infirmary, 84, Castle-street, Glasgow, C.4.

GLASGOW ROYAL INFIRMARY. Senior House Officer in E.N.T. Surgery. Duties at above Infirmary.

Write, giving 3 names for reference, not later than 22nd December, 1956, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. Applications are invited for the post of HOUSE OFFICER in Anæsthetics (commencing 1st February, 1957), and should be addressed to the Medical Superintendent, giving the names of 2 referees.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. ACUTE GERIATRIC UNIT. (70 Beds.) Applications are invited for the post of HOUSE OFFICER (pre-registration) for the 6 months beginning 1st February, 1957, and should be addressed to the Medical Superintendent, giving the names of 2 referees.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. DERMATOLOGY UNIT. (120 Beds.) Applications are invited for the post of HOUSE OFFICER (pre-registration) for the 6 months beginning 1st February, 1957, and should be addressed to the Medical Superintendent, giving the names of 2 referees.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. PSYCHIATRIC UNIT. HOUSE OFFICER required for 6 months beginning 1st February, 1957: 180 Beds, 1600 admissions yearly, acute treatable cases. Unit recognised for D.P.M.

Applications to Medical Superintendent, giving names of 2 referees.

GRIMSBY. SPRINGFIELD HOSPITAL. (210 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (chest and infectious diseases) required. Single accommodation only. This Hospital contains an active Chest Unit and appointee will also have duties at Central Chest Clinic. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. (233 Beds.) SENIOR HOUSE OFFICER for ophthalmology and neurology. Post is vacant on 24th January. Resident accommodation is available. It is tenable for 6 months and renewable. Whitley Council terms. Recognised for both F.R.C.S. and D.O. examinations.

Apply as soon as possible, with copies of 3 testimonials, to Hospital Secretary.

HALIFAX. ROYAL HALIFAX INFIRMARY. (301 Beds.) SENIOR HOUSE OFFICER in General Surgery required. Post vacant in January, 1957. Salary £745 p.a. with deduction of £150 p.a. for board, residence, &c.

Applications to the Group Secretary, Royal Halifax Infirmary, Halifax.

HALIFAX. ROYAL HALIFAX INFIRMARY. (301 Beds.) SENIOR HOUSE OFFICER in Casualty and Orthopædic Surgery required. Post recognised for F.R.C.S. Salary £745 p.a. with deduction of £150 p.a. for board, residence, &c.

Apply to the Group Secretary, Royal Halifax Infirmary, Halifax.

HAVERFORDWEST. PEMBROKE COUNTY WAR MEMORIAL HOSPITAL. (163 Beds.) WEST WALES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) which will become vacant on 1st January next. Salary and conditions of service as laid down by the Ministry of Health.

Applications, stating age, qualifications, experience, and nationality, with names and addresses of 3 referees, to the Group Secretary, West Wales Hospital Management Committee, Glangwili, Carmarthen.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. HOUSE SURGEON (pre-registration) required.

Applications, giving full details and 2 names for reference, should be sent to the Hospital Secretary as soon as possible.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (pædiatrics) which is recognised for the D.C.H.

Applications, giving 2 names for reference, should be sent to the Hospital Secretary at once.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) Applications are invited for the undermentioned appointments:—

HOUSE SURGEON (general) first or second post. To commence 1st January, 1957.

HOUSE SURGEON (general, gynæcology, and obstetrics), first or second post. To commence 1st January, 1957.

Pre-registration posts; recognised under F.R.C.S. regulations.

Applications to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) RESIDENT CASUALTY OFFICER (Senior House Officer grade) with attachment to Pædiatrician and Ophthalmic Consultant. Salary £745 p.a., less £150 p.a. residential emoluments. Recognised under F.R.C.S. regulations. Appointment to commence immediately.

Apply, with full details and references, to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HITCHIN, HERTFORDSHIRE. LISTER HOSPITAL. Applications are invited for RESIDENT HOUSE SURGEON for duty with Accident Service and as Orthopædic House Surgeon. Recognised as pre-registration post and for F.R.C.S., and becomes vacant on 17th January, 1957.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Medical Administrator, Lister Hospital, Hitchin, as soon as possible.

HORNCHURCH. ST. GEORGE'S HOSPITAL. Junior HOSPITAL MEDICAL OFFICER (resident) required from 1st January, 1957, at this Hospital which accommodates 404 chronic sick patients. The post offers excellent geriatric experience.

Applications should be forwarded to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford, as soon as possible.

HUDDERSFIELD ROYAL INFIRMARY. (312 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON (Female) required to commence duties on 23rd December, 1956. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee, The Royal Infirmary, Huddersfield.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the E.N.T. and Ophthalmic Departments, vacant on 15th December, 1956. The post is recognised for pre-registration and for the D.L.O. examination.

Applications, giving full particulars and copies of recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Heath Road WING, IPSWICH. (274 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Resident Anæsthetist), vacant on 3rd January, 1957. The post, which is normally of 1 years duration, is recognised for the D.A. and the F.F.A.R.C.S. examinations.

Applications, stating age, nationality, together with recent testimonials, to Hospital Secretary.

ISLE OF THANET HOSPITAL MANAGEMENT COM- MITTEE.

General Hospital, Ramsgate (101 Beds)
HOUSE SURGEON.

General Hospital, Margate (132 Beds)
HOUSE SURGEON.

Approved pre-registration posts. Salary at the rate of £425–£525 p.a. according to experience, less £125 for residential emoluments.

Applications, with copies of testimonials, to Hospital Secretary of appropriate Hospital.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR (non-resident except on duty nights), vacant immediately. Possession of D.A. desirable. Recognised for F.F.A.R.C.S. Department comprises 3 teams and every kind of surgical work is carried out except thoracic and neurosurgery. Post includes work at neighbouring hospitals.

Application forms obtainable from, and returnable to, Group Secretary, South West Middlesex Hospital Management Committee, Isleworth, by 29th December, 1956.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional MENTAL HOSPITAL.) Applications invited for post of SENIOR HOUSE OFFICER (resident). Board and residence for unmarried applicant available for which a charge of £150 p.a. is made. Hospital, which has 2700 Beds, serves North Lancashire, Westmorland, and parts of the West Riding of Yorkshire, and has an admission-rate of almost 800 of which 80 % are voluntary. All modern forms of treatment are carried out. Facilities afforded to attend D.P.M. Course. Salary according to national terms and conditions of service.

Apply Medical Superintendent.

LEEDS (near). MENSTON (MENTAL) HOSPITAL. Locum Tenens JUNIOR HOSPITAL MEDICAL OFFICER required to commence duty early January, 1957. Residential accommodation for single person.

Applications to Physician-Superintendent, stating age, civil state, qualifications, experience, and names and addresses of 2 referees.

LEEDS (near). MENSTON (MENTAL) HOSPITAL. Applications invited for whole-time appointments (*a*) SENIOR HOUSE OFFICER, (*b*) JUNIOR HOSPITAL MEDICAL OFFICER. Facilities available for training in all branches of psychiatry in conjunction with Department of Psychiatry, Leeds University. Salaries in accordance with terms and conditions of service of hospital medical and dental staffs. Residential accommodation for single persons. No house or flat available.

Applications to Physician-Superintendent, stating age, civil state, qualifications, experience, and names and addresses of 2 referees.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

General Surgery

(i) Dewsbury, Batley and Mirfield Group (120 general surgical beds). May include some duties in the Casualty Department. Resident.

(ii) Halifax Group. 1 of 3 similar posts. Duties divided approximately between general and orthopædic surgery (195 general surgical and 85 orthopædic beds). May include some duties in the Casualty Department. Preferably resident.

(iii) Hull Royal Infirmary (80 general surgical beds) and other hospitals in the Hull A Group. Non-resident. Includes additional duties in the Casualty Department.

Infectious Diseases

Castle Hill Hospital, Cottingham (167 infectious diseases beds). Resident.

Thoracic Surgery

Thoracic Surgical Units at the Bradford Royal Infirmary and The Hospital, Middleton (aggregate of 60 Beds, both non-tuberculous and tuberculous cases). Non-resident.

Applications, stating age, qualifications, and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 5th January, 1957.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. SENIOR HOUSE OFFICER in E.N.T. Department required for a period of 6 months. Post vacant now. Terms and conditions of service for hospital medical staff apply.

Applications, giving details of age, qualifications, posts held with dates, and 3 names for reference, should be sent to the Secretary to the Board, as soon as possible.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. RESIDENT RADIOTHERAPY OFFICER (Senior House Officer status), required for a period of 6 months. The post affords facilities for training for D.M.R.T. Conditions of service for hospital medical staff apply.

Applications, stating age, qualifications, previous posts with dates, and 3 names for reference, should be sent to the Secretary to the Board, as soon as possible.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. REGISTRAR in Dermatology required, for 1 year in first instance, from 1st January, 1957. Terms and conditions of service for hospital medical staff apply.

Applications, stating age, qualifications, previous posts with dates, and 3 names for reference, should be sent to the Sub-Dean, School of Medicine, Leeds, 2, as soon as possible.

LEEDS. UNITED LEEDS HOSPITALS/LEEDS REGIONAL HOSPITAL BOARD. REGISTRAR in Genito-urinary Surgery. Outpatient and Diagnostic Department and 20 Beds at the General Infirmary at Leeds and 40 Beds at St. James's Hospital, Leeds.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 19th December, 1956.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (197 Beds.) RESIDENT HOUSE SURGEON (general surgery). Post vacant 8th January, 1957. Recognised for pre-registration and F.R.C.S. Post provides excellent experience. Good accommodation available.

Applications, with 2 recent testimonials, to Hospital Secretary.

LINCOLN. COUNTY HOSPITAL. (200 Beds. Recognised for training in Gynæcology for M.R.C.O.G.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (obstetrics and gynæcology) required. Post vacant on 1st March. Duties mainly in gynæcology. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LUTON AND DUNSTABLE HOSPITAL, Luton, Bedfordshire. Applications are invited for the post of OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON, vacant 1st January, 1957, and tenable for 6 months. Recognised as pre-registration midwifery post.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Secretary immediately.

LUTON AND DUNSTABLE HOSPITAL, Luton, Bedfordshire. Applications are invited for 2 posts of HOUSE SURGEON, vacant 1st January, 1957, and tenable for 6 months. Recognised as pre-registration posts and for F.R.C.S.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Secretary immediately.

LUTON AND DUNSTABLE HOSPITAL, Luton, Bedfordshire. 2 HOUSE SURGEONS required for Accident Service, including Orthopædic Department, vacant 1st January, 1957, and tenable for 6 months. Recognised as pre-registration posts and for F.R.C.S.

Applications, stating age, nationality, qualifications and experience together with copies of 3 recent testimonials, to be sent to the Secretary immediately.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. ROYAL SOUTHERN HOSPITAL. Applications are invited for temporary appointment to the post of NIGHT CASUALTY OFFICER (House Officer grade) to take up duty as soon as possible for the period to 28th February, 1957. The post is normally resident.

Apply as soon as possible on form obtainable from the Secretary, The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LOWESTOFT AND NORTH SUFFOLK HOSPITAL, LOWESTOFT, SUFFOLK. SENIOR HOUSE SURGEON (resident) required immediately. Salary £745 p.a. Furnished flat available for married officer, if required. Post recognised for Final F.R.C.S. examination requirements. The Hospital has a Consultant General Surgeon and is regularly visited by Consultants in all specialties from the Norfolk and Norwich Hospital. Membership of a Medical Defence Society is a condition of appointment.

Applications, stating age, qualifications and experience, with names and addresses of 2 referees, to Hospital Secretary.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant mid-December, 1956. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £745 a year, less £150 a year for residential emoluments.

Applications to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MANSFIELD. HARLOW WOOD ORTHOPÆDIC HOSPITAL. (328 Beds. Recognised for the F.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT SURGICAL OFFICER (Registrar grade) required. This post offers long term training in orthopædics and traumatic surgery. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

MARGATE. GENERAL HOSPITAL. (132 Beds.) House PHYSICIAN. Approved pre-registration post. Salary at the rate of £425–£525 p.a. according to experience, less £125 for residential emoluments.

Applications, with copies of testimonials, to Hospital Secretary.

MANCHESTER. BOOTH HALL AND MONSALL HOSPITAL MANAGEMENT COMMITTEE. REGISTRAR in Child Psychiatry required, based at the Child Psychiatric Centre, Booth Hall Children's Hospital, Manchester, 9, for 1 year in first instance. Training opportunities available in clinical pædiatrics and time is allowed for attendance at the University Course for the D.P.M., but preference will be given to candidates possessing the D.P.M. and/or to those who have had experience in adult psychiatry. Candidates may visit the unit by arrangement.

Application forms from Group Secretary, Booth Hall Hospital, to be returned not later than 31st December.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. WITHINGTON HOSPITAL, MANCHESTER, 20. The Board invites applications for the post of REGISTRAR in Pathology, Group Laboratory, Withington Hospital (1088 Beds), to commence 1st February, 1957. The Laboratory is recognised for the D. Path. examination, and facilities are available for training in all branches of clinical pathology.

Applications, stating age, qualifications, present post, experience, and names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, to arrive not later than 22nd December, 1956.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL INFIRMARY, MANCHESTER, 13. SENIOR REGISTRAR to a Medical Unit combining neurology and general medicine, to commence on 1st March, 1957. Whole-time, non-resident post, tenable for 12 months, renewable. Applicants must possess a higher qualification and preference will be given to those interested and desirous of training in neurology. Arrangements may eventually be made for the successful candidate to transfer to one of the Manchester Regional Hospitals to continue training.

Application form obtainable from the undersigned, to be returned not later than 29th December, 1956.

F. J. CABLE, Secretary to the Board of Governors.

MANCHESTER. UNITED MANCHESTER HOSPITALS. SAINT MARY'S HOSPITALS, MANCHESTER. Applications are invited from registered medical practitioners, Male or Female, for the post of HOUSE PHYSICIAN in the Neonatal Unit of Saint Mary's Hospitals (attached to the University Department of Child Health) for a period of 6 months, vacant on 1st February, 1957. Previous hospital experience essential and pædiatric experience desirable. Duties include the care of the newborn in the Maternity Department, the care of infants in the infants' ward and work in the clinics under the charge of the Department of Child Health. Salary in accordance with national scale.

Applications, stating qualifications and experience together with the names of 3 referees, should be sent to the undersigned not later than 31st December, 1956.

A. R. WISE, General Superintendent.

Saint Mary's Hospitals, Whitworth Park, Manchester, 13.

MANCHESTER. DUCHESS OF YORK HOSPITAL FOR BABIES, Burnage-lane, MANCHESTER, 19. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. There will be a vacancy at the above Hospital, which is associated with the Manchester University for teaching purposes, for a RESIDENT HOUSE OFFICER (Male or Female), post- or second pre-registration, for 6 months commencing 1st January, 1957.

Applications, with copies of 3 testimonials, to be sent to the Administrative Officer of the Hospital.

MAIDENHEAD HOSPITAL, Berkshire. Applications invited for post of RESIDENT SENIOR HOUSE OFFICER (general medical) at above Hospital, with duties at Maidenhead St. Mark's Hospital (mainly geriatric cases), and at Maidenhead Isolation Hospital.

Applications, stating age, qualifications, experience and nationality, with names of 3 referees, to Secretary.

MORECAMBE. QUEEN VICTORIA HOSPITAL. (100 Beds.) RESIDENT SENIOR HOUSE OFFICER (obstetrics and gynæcology). Post vacant early January, 1957, and tenable for 1 year. Successful applicant will work with the Specialist Unit, but will be expected to relieve the Senior House Officer (Surgical) during absence.

Applications, with full particulars to Group Secretary, Royal Lancaster Infirmary, Lancaster.

NEWARK GENERAL HOSPITAL. Nottingham No. 1 HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER (surgical) required for the above Hospital, situated on the Great North-road approximately 20 miles from Nottingham. Post offers good experience. The Consultant staff attending Newark Hospital are on 1 or more of the Nottingham Hospitals. During next few months a flat will be available as married quarters but in the meantime single accommodation can be provided. Salary £775–£50–£1075. Duties to commence as soon as possible.

Applications, giving names of 3 referees, should be sent to the Group Secretary, Nottingham No. 1 Hospital Management Committee, General Hospital, Nottingham.

NEWCASTLE REGIONAL HOSPITAL BOARD.

REGISTRAR PSYCHIATRIST (whole-time) St. George's Hospital, Morpeth (1250 Beds). Accommodation available.

REGISTRAR PSYCHIATRIST (whole-time), resident, Winterton Hospital, Sedgefield (2040 Beds).

Arrangements can be made for the appointees to take the necessary courses of study for the University of Durham D.P.M.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, Benfield-road, Newcastle upon Tyne, 6, within 21 days.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the non-resident appointment of SENIOR HOUSE OFFICER to the Department of Psychological Medicine at the Royal Victoria Infirmary. The successful candidate will have opportunity for clinical experience in inpatient and outpatient work under the direction of the Professor in Psychological Medicine at the University of Durham and he will also be responsible for emergency duty as required. A new 54-Bedded Research and Clinical Unit has recently been opened at Newcastle General Hospital at which he will also have an opportunity to gain experience. The appointment is for 1 year and will be subject to the terms and conditions of service of hospital medical staff.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWMARKET GENERAL HOSPITAL. Applications are invited for the post of HOUSE SURGEON, vacant 1st January, 1957. Duties include surgical house charge of general surgical, E.N.T., and eye cases. Post resident and available for 6 months, recognised for pre-registration.

Applications, with copies of 3 testimonials, to the Medical Superintendent.

NEWTON ABBOT HOSPITAL, S. Devon. Senior House OFFICER (medicine), Male or Female, required 30th December, 1956. Duties divided equally between 20 acute medical beds in General Section and 140 geriatric beds. This officer is also required to stand in when Senior House Surgeon otherwise engaged. Married quarters available.

Applications, stating qualifications, nationality, age, with copy testimonials, to be sent to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay, S. Devon.

NOTTINGHAM CHILDREN'S HOSPITAL. (136 Beds. Recognised for the D.C.H.) Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) falling vacant at the end of January. The post s tenable for 6 months or a year by agreement.

Applications, with copies of 2 testimonials, should be sent to the Secretary, Nottingham Children's Hospital, Chestnut-grove, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. 2 resident pre-registration or registered HOUSE SURGEONS required; one immediately, one 1st January.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (casualty), duties to commence 31st January, 1957. Establishment 3. Recognised for F.R.C.S. Post offers wide experience of casualty work.

Applications, stating age, nationality, qualifications, and experience, together with copies of testimonials, to be sent to Secretary, General Hospital, Nottingham.

OXFORD REGIONAL HOSPITAL BOARD. National SPINAL INJURIES CENTRE, STOKE MANDEVILLE HOSPITAL, AYLESBURY. Applications are invited for the post of REGISTRAR at this Centre. Experience in general surgery and medicine necessary. The post offers good experience in neurology, urology, physical medicine and rehabilitation. Full details of duties, &c., can be obtained from the Administrative Officer, Stoke Mandeville Hospital.

Applications, on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 5th January, 1957.

POOLE GENERAL HOSPITAL, Poole, Dorset. Bournemouth and East Dorset Hospital Management Committee. Applications are invited for the appointment of RESIDENT ANÆSTHETIC REGISTRAR. The post, which is now vacant, is recognised for the D.A. and F.F.A.R.C.S. and is tenable for 1 year in the first instance. A furnished flat is available.

Forms of application, obtainable from the Group Secretary, Hospital Management Committee Office, Royal Victoria Hospital, Gloucester-road, Boscombe, Bournemouth, should be returned to him, duly completed, within 14 days of the appearance of this advertisement.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Royal Portsmouth Hospital (65 medical beds)

HOUSE PHYSICIAN (pre-registration), vacant 4th January, 1957.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

St. Mary's Hospital, Milton-road, Portsmouth.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for MEDICAL REGISTRAR to the Portsmouth Group of hospitals, vacant 1st January, 1957.

Forms of application may be obtained from the Group Secretary, Portsmouth Group Hospital Management Committee, Saint Mary's Hospital, Portsmouth, which should be returned to him duly completed on or before 24th December, 1956. Canvassing will disqualify. Candidates are invited to visit the hospitals by arrangement.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL.

SENIOR HOUSE OFFICER in Surgery, vacant 1st February, 1957. Recognised for the F.R.C.S. Greenbank Road Section.

HOUSE SURGEON (pre-registration post), vacant immediately. Recognised for the F.R.C.S. Greenbank Road Section.

HOUSE SURGEON (pre-registration post), vacant 1st January, 1957. Recognised for the F.R.C.S. Freedom Fields Section.

Applications, stating age, nationality, qualifications and experience, together with the names and addresses of 3 referees, to be sent to—

ARTHUR R. CASH, Group Secretary, Plymouth, South Devon and East Cornwall General Hospital Group. 7, Nelson-gardens, Stoke, Plymouth.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (Area Accident and Orthopædic Department), vacant mid-December. Recognised for F.R.C.S. Duties including work in area Casualty Department at Battle Hospital, Reading (300 Beds). Person appointed will work with Registrar and House Officers.

Apply, stating nationality, present post and qualifications with dates, together with names of 2 referees, to Group Secretary, 3, Craven-road, Reading.

READING COMBINED HOSPITALS. Area Department OF OBSTETRICS AND GYNÆCOLOGY. (100 Beds.) Applications are invited from registered medical practitioners for the resident post of HOUSE SURGEON to the above Department. The appointment, which is vacant on 1st January, 1957, is for 1 year, with 6 months gynæcology at the Royal Berkshire Hospital, and 6 months in the Maternity Unit at Battle Hospital. Both appointments are recognised for the Diplomas of the Royal College of Obstetricians and Gynæcologists.

Write, stating age and qualifications with dates, nationality and present appointment, with copy of 1 recent testimonial, to Secretary, Royal Berkshire Hospital, Reading.

RICHMOND, SURREY. ROYAL HOSPITAL. (Acute General Hospital—121 Beds.) Applications are invited for the non-resident post of CASUALTY OFFICER (Senior House Officer grade). Post vacant 18th December, 1956.

Applications, with names of 2 referees, to the Administrative Officer at the above Hospital.

ROTHERHAM HOSPITAL, Doncaster Gate. (161 Beds. Recognised for D.A.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (anæsthetics) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 28th December, 1956, giving age, nationality, qualifications, present and previous appointments, with dates, naming 3 referees.

RUSTINGTON, SUSSEX. ZACHARY MERTON MATERNITY HOSPITAL. (48 Beds.) Applications are invited for a RESIDENT HOUSE OFFICER (preferably Female). Post vacant 15th January, 1957. Salary £425–£525 p.a. according to experience, less £125 p.a. for emoluments.

Applications to be submitted to the undersigned immediately.

A. V. OAKTON, Group Secretary, Worthing Group Hospital Management Committee. 129, Brighton-road, Worthing, Sussex.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) SENIOR HOUSE OFFICER (neurosurgery) required from 18th January, 1957. Suitable for candidates seeking higher medical or surgical qualifications. Recognised for the F.R.C.S. (Eng.).

Apply to Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford, as soon as possible.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE SURGEON (Male) required from 17th January, 1957. Post not approved for pre-registration purposes.

Applications should be forwarded immediately to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) Temporary SURGICAL REGISTRAR (Male) required from 1st January, 1957.

Applications should be forwarded immediately to Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

SHREWSBURY. CROSS HOUSES HOSPITAL. (34 maternity beds.) OBSTETRIC HOUSE SURGEON (pre-registration post), vacant immediately.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. ROYAL SALOP INFIRMARY AND COPTHORNE HOSPITAL. (590 Beds.) RESIDENT ANÆSTHETIST (Senior House Officer). Post recognised for F.F.A.R.C.S. Registrar also employed. Vacant 1st January, 1957.

Applications and copy testimonials to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. EYE, EAR AND THROAT HOSPITAL. SENIOR HOUSE OFFICER (ophthalmic). Eye Unit 35 Beds. Post recognised for the D.O.M.S. Vacant 19th January, 1957.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. SHELTON MENTAL HOSPITAL. (1000 Beds.) SHREWSBURY HOSPITAL GROUP. JUNIOR HOSPITAL MEDICAL OFFICER. Appointment for 1 year in first instance. Residential accommodation available. Recognised for D.P.M.

Applications to Medical Superintendent.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Orthopædic Surgery to the West Fife Group of hospitals, based on the Dunfermline and West Fife Hospital.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th January, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in Medicine in the Northern Group of hospitals. Initially the duties will be in the Gastro-intestinal Unit and later in a General Medical Unit at the Western General Hospital for an approximately equal time.

Apply, stating age, qualifications, and previous experience and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh (from whom further particulars may be obtained), by 5th January.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

REGISTRAR in Surgery based at the Royal Infirmary, Stirling.

REGISTRAR in Surgery based at the Royal Alexandra Infirmary, Paisley.

REGISTRAR in Surgery based at Greenock Royal Infirmary.

REGISTRAR in Pathology based at the Royal Infirmary, Glasgow, for duties on a rotational basis at the Royal Maternity Hospital, Glasgow.

REGISTRAR in Orthopædics based at the Western Infirmary, Glasgow, with duties at Killearn Hospital.

REGISTRAR in Medicine based at the Victoria Infirmary, Glasgow.

These appointments are subject to the National Health Service (Scotland) superannuation regulations.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 29th December, 1956.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. CHILDREN'S HOSPITAL. Applications invited from registered medical practitioners for the resident post of HOUSE PHYSICIAN to the Professorial Unit at the above Hospital, vacant 19th January, 1957 (6 months).

Applications, stating age, qualifications and experience, with the names of 3 referees or copy testimonials, should reach the Superintendent, Children's Hospital, Western Bank, Sheffield, 10, not later than 18th December, 1956.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications invited for the post of SENIOR REGISTRAR in Clinical Pathology. Possession of a higher qualification desirable but not essential. The appointment is for 1 year in the first instance and will be reviewed annually. It has been agreed in principle between the Board of Governors of the United Sheffield Hospitals and the Sheffield Regional Hospital Board that the appointment, if extended for the full period, will be divided, subject to satisfactory work and progress, between the United Sheffield Hospitals and a hospital in the Region (at present the Derbyshire Royal Infirmary).

Applications, stating age, qualifications and experience, with the names of 3 referees, should be sent not later than 5th January, 1957, to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

SHOTLEY BRIDGE GENERAL HOSPITAL, Shotley BRIDGE, CONSETT, CO. DURHAM. NORTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from suitably qualified medical practitioners for the whole-time post of JUNIOR HOSPITAL MEDICAL OFFICER (vacant 1st January, 1957), in the Orthopædic Department (58 Beds). Salary scale £775–£50–£1075 p.a. with deduction of £170 p.a. if resident. There is scope for comprehensive experience in all aspects of orthopædic inpatients and outpatients, and all modern methods of treatment are used.

Applications, stating age, qualifications, experience with dates, together with copies of 2 testimonials, should be forwarded to the Group Secretary as soon as possible.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. WINDSOR GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum HOUSE PHYSICIAN required 31st December–13th January.

Applications, with names of 2 referees, to Secretary, not later than 19th December.

SUNDERLAND AREA HOSPITAL MANAGEMENT COMMITTEE. RESIDENT ANÆSTHETIST is required for duties at hospitals in the above Group. Senior House Officer grade. Post vacant December. The post offers good practical experience under the supervision of the visiting Anæsthetists. The hospitals are recognised for the F.F.A.R.C.S. and the D.A. In addition every opportunity is given to attend lectures at the neighbouring University 12 miles away.

Apply to the Group Secretary, Sunderland Area Hospital Management Committee, General Hospital, Sunderland, naming 2 referees.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Ophthalmology to fill a vacancy in the approved trainee establishment at the Brighton and Lewes Group of hospitals, for duties mainly at the Sussex Eye Hospital, Eastern-road, Brighton, 7, available on 1st March, 1957. The post is recognised for the F.R.C.S. and D.O. and may be either resident or non-resident ; no accommodation is available for a married practitioner. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications, and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 29th December, 1956.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Psychiatry to fill a vacancy in the approved trainee establishment at Bexley Hospital, Dartford Heath, Bexley, Kent. Previous experience in general medicine is desirable. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications, and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 29th December, 1956.

SOUTHEND-ON-SEA GENERAL HOSPITAL. Applications are invited from registered or provisionally registered practitioners for appointment as RESIDENT HOUSE SURGEON. Post now vacant. Salary according to previous appointments held, less a prescribed charge for residential emoluments.

Applications, stating age, qualifications and previous experience, with copies of recent testimonials (1 testimonial sufficient from applicants for first appointment) to be sent to the undersigned immediately. J. C. FIELD, Secretary.

SOUTHEND-ON-SEA GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical). Post vacant 10th January, 1957. Recognised for F.R.C.S.

Applications, stating age, qualifications and experience, with copies of 2 recent testimonials, should reach the undersigned at the Hospital by 19th December, 1956.

J. C. FIELD, Secretary.

SOUTHEND-ON-SEA GENERAL HOSPITAL. Applications are invited for appointment as HOUSE PHYSICIAN (pre-registration). Post vacant 17th January, 1957.

Applications, stating age, qualifications and previous experience, with copies of recent testimonials (1 testimonial sufficient from applicants for first appointment) to reach the undersigned by 19th December, 1956. J. C. FIELD, Secretary.

SOUTHPORT GENERAL INFIRMARY. (Recognised for F.R.C.S. and pre-registration.) HOUSE SURGEON (general surgery and ophthalmology). Post vacant 12th January, 1957.

Apply, with 2 copy testimonials, to Group Secretary, Southport and District Hospital Management Committee, Promenade Hospital, Southport.

SOUTHPORT GENERAL INFIRMARY. (Recognised for F.R.C.S. and pre-registration.) HOUSE SURGEON (general surgery and gynæcology). Post vacant 20th January, 1957.

Apply, with 2 copy testimonials, to Group Secretary, Southport and District Hospital Management Committee, Promenade Hospital, Southport.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. SENIOR HOUSE OFFICER (E.N.T.) required, vacant very shortly. Recognised F.R.C.S. and D.L.O.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE PHYSICIAN (general medicine) with Dermatology. Pre-registration post.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. Applications invited for HOUSE OFFICER (medical), vacant mid-January. Recognised pre-registration post.

Detailed applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

SWANSEA. MOUNT PLEASANT HOSPITAL. (236 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of SENIOR HOUSE OFFICER in Obstetrics for the Maternity Unit of 40 Beds at the above Hospital. The post, which will become vacant on 1st February, 1957, is for a period of 12 months, and is recognised for the D.Obst.R.C.O.G. examination.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, should be sent to the Hospital Secretary not later than 28th December, 1956.

T. E. JONES, Group Secretary.

ST. ALBANS (near), HERTFORDSHIRE. NAPSBURY MENTAL HOSPITAL. JUNIOR HOSPITAL MEDICAL OFFICER (full-time) required. 3 years tenure. Some experience in psychiatry desirable. Single accommodation available.

Apply to Medical Superintendent by 22nd December, 1956.

ST. ALBANS CITY HOSPITAL, St. Albans, Hertfordshire. (384 Beds.) HOUSE SURGEON (House Officer grade) required for 1 of the 2 general surgical teams. Recognised for F.R.C.S. Post vacant 7th January, 1957, and tenable for 6 months. Preference given to candidates seeking post under the Medical Act, 1950.

Applications to Secretary, Mid Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) SENIOR HOUSE OFFICER (orthopædic), required for the above Hospital (Orthopædic Unit 74 Beds) in February. This Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of tranmatic conditions.

Applications, with copies of testimonials, to be submitted as soon as possible to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL (274 Beds) and SOUTHAMPTON GENERAL HOSPITAL (472 Beds). SENIOR HOUSE OFFICER (E.N.T.) required. This post is recognised for the F.R.C.S. (Eng.) and D.L.O. examinations and provides experience in all branches of E.N.T. work. The Group includes a diagnostic and distributing Hearing Aid Centre.

Applications, with copies of recent testimonials, should be forwarded as soon as possible, to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

STOCKPORT. CHERRY TREE HOSPITAL. (Isolation—96 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER.

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Group Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

STAFFORD. STAFFORDSHIRE GENERAL INFIRMARY. (175 Beds—Recovery Unit 32 Beds.) HOUSE SURGEON (pre-registration post), vacant 26th December. At end of term of service the successful applicant will be considered for appointment to a pre-registration post of House Physician if he or she has not held such an appointment.

Applications to Group Secretary, Stafford Hospital Management Committee, 13, Foregate-street, Stafford.

STAFFORD. STAFFORDSHIRE GENERAL INFIRMARY. (175 Beds—Recovery Unit 32 Beds.) HOUSE PHYSICIAN (pre-registration post), vacant 10th January. At end of term of service the successful applicant will be considered for appointment to a pre-registration post of House Surgeon if he or she has not held such an appointment.

Applications to Group Secretary, Stafford Hospital Management Committee, 13, Foregate-street, Stafford.

SULLY HOSPITAL, Sully, Penarth, Glamorganshire. (Thoracic Centre—324 Beds.) SENIOR HOUSE OFFICER (medical), required commencing February, 1957. Experience available in investigation and treatment of all lung and heart diseases in adults and children.

Form of application from Group Secretary, 44, Cathedral-road, Cardiff.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SWINDON HOSPITALS. Applications invited for post of RESIDENT HOUSE PHYSICIAN (1 of 2) in acute Medical Unit of 64 Beds at St. Margaret's Hospital. Recognised for training under pre-registration internship regulations and vacant on 6th January, 1957.

Full details, with names of 3 referees, to Secretary, 7, Okus-road, Swindon, immediately.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SWINDON HOSPITALS. Applications invited for post of RESIDENT HOUSE SURGEON for General Surgical Unit of 80 Beds at Victoria Hospital. Recognised for F.R.C.S. and training under pre-registration internship regulations, and vacant on 17th January, 1957. Married accommodation available.

Full details, with names of 3 referees, to Secretary, 7, Okus-road, Swindon, immediately.

TORQUAY. TORBAY HOSPITAL. (166 general beds.) RESIDENT HOUSE OFFICER (surgical), Male or Female, required approximately middle January, 1957. Post recognised for F.R.C.S. and pre-registration purposes. There is a complement of 6 Resident House Officers.

Applications, stating qualifications, nationality, and age, together with copy testimonials (quoting reference F.955/74) to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay, S. Devon.

TUNBRIDGE WELLS. KENT AND SUSSEX HOSPITAL. Applications are invited for the post of Part-time CLINICAL ASSISTANT to the E.N.T. Department of the above Hospital working under the general direction of the Consultant E.N.T. Surgeons. The post is at present for 3 sessions a week; salary £175 p.a. per session.

Applications, stating age, qualifications and experience, with names of referees, to Group Secretary, Tunbridge Wells Group Hospital Management Committee, Sherwood Park, Tunbridge Wells, Kent.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. REGISTRAR required to the Special Unit for Research in Juvenile Rheumatism. Post offers scope for those interested in research, paediatrics, rheumatology or cardiology.

Application forms from, and returnable to, Secretary, Windsor Hospital Management Committee, Alma-road, Windsor, by 6th January.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for post, vacant 31st January. Preference given to persons seeking pre-registration post.

Applications, stating age, qualifications with dates, with copies of 2 testimonials, to Secretary.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for post, vacant 25th January. Preference given to persons seeking pre-registration post.

Applications, stating age, qualifications with dates, with copies of 2 testimonials, to Secretary.

WARWICK HOSPITAL. (320 Beds.) House Physician. Post recognised pre-registration. Resident. Vacant 25th January.

Applications, with 2 testimonials, to Medical Superintendent.

WARWICK HOSPITAL. (320 Beds.) House Surgeon. Pre-registration or registered candidates may apply. Good experience in general surgery. Vacant 25th January. Married quarters available.

Applications, with 2 testimonials, to Medical Superintendent.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (208 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital. This is a pre-registration post and is recognised for F.R.C.S. Salary according to the National Health Service scale.

Applications, with copies of recent testimonials, to the Administrator.

WATFORD. SHRODELLS HOSPITAL. (380 Beds.) Applications are invited for the post of GYNÆCOLOGICAL HOUSE OFFICER (pre- or post-registration), to take up duty on 1st January. If held by a registered medical practitioner the post will be paid on Junior Hospital Medical Officer scale.

Appl cations, with copies of 2 testimonials, should reach the Medical Officer-in-Charge as soon as possible.

WEST DORSET GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEONS (Male or Female) required for 2 resident posts, vacant early February, 1957:—

(*a*) Dorset County Hospital, Dorchester (109 Beds).

(*b*) Weymouth and District Hospital, Weymouth (124 Beds).

Both appointments are recognised for F.R.C.S. examination, and approved for Pre-registration Service.

Applications, stating age and qualifications, together with copy testimonials, to Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset, immediately.

WINDSOR CHEST CLINIC. Registrar required. Good training in general medicine essential, and special experience in chest diseases desirable. This Clinic, which may be visited by direct arrangement with Physician-in-Charge, has 50 Beds attached, and is in close contact with Harefield and Pinewood Chest Hospitals.

Application forms from, and returnable to, Secretary, Windsor Group Hospital Management Committee, Alma-road, Windsor, by 30th December.

WINDSOR. KING EDWARD VII HOSPITAL. Resident SURGICAL REGISTRAR required, February.

Application forms obtainable from, and returnable to, Secretary, Windsor Group Hospital Management Committee, Alma-road, Windsor, by 23rd December.

WOKING VICTORIA HOSPITAL, Woking, Surrey. (72 Beds.) SENIOR HOUSE OFFICER (post-registration appointment) required for medical, surgical and casualty duties; post vacant 1st January, 1957.

Apply, with 2 testimonials, to Hospital Secretary.

WREXHAM (near). TREVALYN MANOR MATERNITY HOSPITAL, ROSSETT, near WREXHAM. (47 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties on 1st February, 1957. The Hospital is recognised by Central Midwives Board as a Part II Midwifery Training School and deals with normal and abnormal midwifery.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WOLVERHAMPTON GROUP. The Royal Hospital. JUNIOR PATHOLOGIST required. Salary in Junior Hospital Medical Officer grade. Comprehensive service offering wide experience and training. Post vacant shortly. Candidates may visit Pathologist.

Applications to Group Secretary, The Royal Hospital, Wolverhampton.

WOLVERHAMPTON. THE ROYAL HOSPITAL. (An Associated Hospital of the University of Birmingham Medical School.) Pre-registration HOUSE OFFICERS.

Vacancies in Surgery occur December, early January and mid-January.

Applications, with copies of testimonials, to the Secretary.

WORCESTER ROYAL INFIRMARY. Applications invited for the post of SENIOR HOUSE OFFICER in Medicine (resident), vacant mid-January. The post is that of Resident Medical Officer and is normally of 1 years duration.

Applications, with names of referees, to be sent to the Hospital Secretary.

DUBLIN. DR. STEEVENS' HOSPITAL. Applications are invited from qualified practitioners with surgical experience for the position of SENIOR SURGICAL REGISTRAR to the Hospital. Each candidate should state his age and furnish full particulars of his surgical and medical qualifications and experience. The appointment shall be for 1 year, but may be renewed for a second and third year, and the appointee shall be responsible for intern and extern patients. The salary will be £500 p.a., non-resident.

Applications should reach the undersigned on or before 8th January, 1957. WILLIAM KENNEDY, Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. (313 Beds.) CASUALTY OFFICER (Senior House Officer grade) required. Vacant 28th January. Post recognised for the F.R.C.S. The appointment will be for 6 months in the first instance.

Applications, with copies of 2 testimonials, to the Group Secretary.

NEW YORK. NEW ROCHELLE HOSPITAL, New ROCHELLE, NEW YORK, U.S.A. (360-Bed general community hospital.) Approved by the Joint Commission on Accreditation of Hospitals. Also approved by the American College of Surgeons and American Medical Association for Interneship and Residency training. Only graduates from approved university schools accepted. INTERNESHIPS available for the 1 year term commencing 1st July, 1957. Stipend is $200 per month plus complete maintenance. Passage back to England paid by Hospital after completion of 12-month Interneship.

Apply Superintendent.

Public Appointments

BIRMINGHAM. CITY OF BIRMINGHAM EDUCATION COMMITTEE. Applications are invited from registered medical practitioners (Men or Women) for appointment as SCHOOL MEDICAL OFFICER in the School Health Service. The possession of a D.P.H. or D.C.H. will be an advantage. Salary in accordance with Whitley Council scale of £1050–£50–£1200–£55–£1475 p.a. Appointment is subject to the appropriate superannuation act and to the passing of a medical examination.

Forms of application obtainable from the undersigned (stamped addressed envelope) must be returned not later than 31st December, 1956. Canvassing disqualifies.

E. L. RUSSELL, Chief Education Officer.

School Health Service, Queen's College Chambers, 38A, Paradise-street, Birmingham, 1.

GOLD COAST LOCAL CIVIL SERVICE. Ministry of HEALTH. Applications are invited from doctors with registrable qualifications for the following posts in the Gold Coast Local Civil Service :

(1) PATHOLOGISTS to carry out routine duties of Clinical Pathologists, including hæmatology, bacteriology, histopathology and biochemistry. May be required to perform post-mortem examinations and other duties in connection with forensic medicine. Candidates must have had at least 2 years full-time approved laboratory experience.

(2) MEDICAL OFFICERS OF HEALTH to prevent disease and carry out treatment whenever necessary. Candidates must possess Diploma of Public Health.

Appointment may be :—

(*a*) Contract for 2 tours of duty of 18–24 months with gratuity (taxable) of £12 10*s.* for each completed month of service.

(*b*) 3 years probation for permanent and pensionable employment. Pension (non-contributory) at rate of 1/600th of final pensionable emolvments for each completed month of service ; or

(*c*) From the National Health Service retaining superannuation rights while in the Gold Coast (up to 6 years) and receive a gratuity (taxable) of 20% of Gold Coast salary.

Salary under (*a*) from £1330 to £2310 a year and under (*b*) and (*c*) £1055 to £1850 a year, starting point being determined by qualifications and experience. Temporary addition of £29 15*s.* a year also payable.

Quarters when available at rental not exceeding £150 a year. Income-tax at local rates. Free passages for Officer, wife, and up to 3 children under 13 years of age. Annual local leave permissible and generous hon.e leave granted after each tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD. 117/13/010).

GOLD COAST LOCAL CIVIL SERVICE. Ministry of HEALTH. Medical Officers for Medical Field Units. MEDICAL OFFICERS (single or married) required. Possession of D.T.M. & H. and previous tropical experience desirable but not essential. Selected candidates may be required to do D.T.M. & H. course before leaving for Gold Coast in which case fees and an allowance will be paid. Work consists of control of endemic and epidemic disease by field survey and mass treatment. Medical Officers are normally in sole charge of a Unit working in an area of many hundreds of square miles and consisting of some 50 lay assistants under direct supervision. House provided at every Field Unit headquarters but considerable travelling is necessary. Most travelling is done in officer's own car for which generous maintenance and mileage allowances are paid. As Field Units operate almost exclusively in remote areas with few social amenities officers of adventurous spirit who can make their own leisure amusements are best suited. Work offers great scope for field research into largely unknown epidemiological problems and is likely to appeal to men with inclination towards preventive medicine who enjoy active life.

Appointment is to Gold Coast Local Civil Service and may be :

(*a*) Contract for 2 tours of duty of 18–24 months with gratuity (taxable) of £12 10*s.* for each completed month of service.

(*b*) 3 years probation for permanent and pensionable employment. Pension (non-contributory) at rate of 1/600th of final pensionable emoluments for each completed month of service ; or

(*c*) From National Health Service retaining superannuation rights while in the Gold Coast (up to 6 years) and receiving on termination of engagement a gratuity (taxable) of 20% of their Gold Coast salary.

Salary under (*a*) from £1330 to £2310 a year and under (*b*) and (*c*) £1055 to £1850 a year, starting point being determined by qualifications and experience. Temporary addition of £29 15*s.* a year also payable.

Quarters at rental not exceeding £150 a year. Income-tax at local rates. Free passages for Officer, wife, and up to 3 children under 13 years of age. Annual local leave permissible and generous home leave granted after each tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD. 117/13/04).

GOVERNMENT OF THE EASTERN REGION OF NIGERIA. MEDICAL OFFICERS OF HEALTH required to undertake general administration of environmental hygiene, maternal and child welfare, school health work, health education and control of communicable diseases. Women candidates are eligible and would be encouraged to concentrate on school health and welfare duties. At present emphasis is being placed on the development of a School Health Service and on tuberculosis control. Officers may be required to visit rural areas around the township where their principal responsibility lies. Candidates must possess medical qualifications registrable in United Kingdom and a Diploma in Public Health. Appointment is on contract for 2 tours of not more than 2 years. Salary scale ranges from £1434 to £2118 a year, and a gratuity (taxable) is payable on completion of satisfactory engagement at the rate of £37 10*s.* for each completed period of 3 months service (including leave).

Quarters provided at rental of 10% of salary. Taxes at local rates. Annual local leave permissible ; generous home leave granted after each tour. Free return passages for Officer and wife ; and, when appropriate either (but not both) of the following in any 1 tour of service :—

(*a*) 1 return sea passage for each of 2 children under the age of 18 subject to a maximum of £75 in respect of the return journey for each child, or

(*b*) An allowance of £75 a year for each of 2 children under the age of 18 maintained outside Nigeria for the whole of the tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting reference No. BCD.117/411/05).

FACTORY DOCTORS. Factories Acts, 1937 and 1948. The following appointments as Appointed Factory Doctor are vacant. Apply to Chief Inspector of Factories, 19, St. James's-square, London, S.W.1.

District	*County*	*Latest date for receipt of applications*
NEWMAINS ..	LANARK	5TH JANUARY, 1957
WINDERMERE ..	WESTMORLAND ..	5TH JANUARY, 1957
TURRIFF ..	ABERDEEN ..	5TH JANUARY, 1957

HER MAJESTY'S OVERSEA SERVICE. Kenya. Medical OFFICERS with qualifications registrable in United Kingdom required for general duties. Successful candidates may be posted to any station in Kenya. During earlier years of service an officer will be expected to carry out general medical and surgical duties including varying amount of public-health administration. In most stations, even if remote from the larger towns, it is possible to maintain interest in any particular branch of medicine or surgery, to which the officer is attracted. The work of every medical officer is based on a hospital which may vary in size and facilities from small district hospital, meeting needs of comparatively primitive community, to large and modern provincial hospital. Appointments can be made on permanent basis with pension (non-contributory), or on short-term contract with gratuity (taxable) payable on satisfactory completion of service. Normal retiring age is 55. Salary ranges from £1284 to £2115 a year, starting point determined by experience. 4 extra increments given to successful candidates possessing the F.R.C.S., M.R.C.P., D.P.H., or other approved higher qualifications. Permanent Medical Officers are eligible to be considered at any time for promotion to super-scale posts in Kenya and other territories in medical administrations or, if they possess higher qualification and suitable experience, in specialist posts. Quarters at rental varying from £30 to £78 a year according to size and type, and furniture at rate varying from £15 to £36 a year. Free passages in both directions for Officer and wife and up to cost of 1 adult fare for children. Taxation at local rates. Annual local leave permissible and generous home leave granted after each tour of from 24 to 45 months. Educational facilities available.

Application forms from Director of Recruitment, Colonial Office, Great Smith-street, London, S.W.1 (quoting No. BCD. 117/7/02).

HER MAJESTY'S OVERSEA SERVICE. Northern REGION NIGERIA. MEDICAL OFFICERS OF HEALTH required for administration of preventive medical service and control of sanitary matters (including statutory duties of an M.O.H.), or if posted to an airport the duties of Port Health Officer. May be required to perform general duties of Medical and Health Officers and other duties in connection with epidemic diseases. Officers may be posted to undertake rural health work, including medical surveys and mass treatment of endemic diseases. Candidates must possess medical qualifications registrable in United Kingdom and D.P.H. Diploma in Tropical Hygiene an asset.

Appointments may be made :—

(*a*) On 3 years probation for permanent and pensionable employment. Pension (non-contributory) at rate of 1/600th of final pensionable emoluments for each completed month of reckonable service.

(*b*) From National Health Service. Candidates may leave but retain superannuation rights up to 6 years and receive a gratuity (taxable) of 20% of the aggregate of salary. Salary for officers appointed under (*a*) or (*b*) ranges from £1212 to £1950 p.a., or

(*c*) On short-term contract (2 tours each of 18–24 months) with salary of £1434–£2286, and gratuity (taxable) of £37 10*s.* for each completed period of 3 months service (including leave).

Officers appointed under (*a*) or (*c*) are required to contribute to a Widows' and Orphans' Pension Scheme.

Quarters provided at low rental. Taxes at local rates. Annual leave permissible ; generous home leave granted after each tour of 18–24 months. Free passages in both directions for Officer and wife ; assisted passages for children. Allowances for children of £120 a year for first child, £96 for second, and £72 for third.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD.117/408/026).

KINGSTON UPON HULL. CITY AND COUNTY OF KINGSTON UPON HULL. DEPUTY MEDICAL OFFICER OF HEALTH, DEPUTY PRINCIPAL SCHOOL MEDICAL OFFICER, DEPUTY PORT MEDICAL OFFICER OF HEALTH, MEDICAL INSPECTOR OF ALIENS. Applications are invited from duly qualified medical practitioners for the appointment of Deputy Medical Officer of Health for the City, to be held in conjunction with the appointments of Deputy Principal School Medical Officer, Deputy Medical Officer of Health (at Hull) to the Hull and Goole Port Health Authority, and Medical Inspector of Aliens under that Authority. Applicants must hold the Diploma in Public Health, and the possession of additional degrees, diplomas or academic distinctions will be considered an advantage. Salary scale £1700 p.a., rising by 2 annual increments of £105 and 1 of £55 to a maximum of £1965 p.a., plus essential user car allowance.

Particulars of the appointment and forms of application may be obtained from the Medical Officer of Health, Guildhall, Kingston upon Hull, to whom completed application forms must be returned not later than 7th January, 1957.

LEEDS. CITY OF LEEDS. Public Health Department. Applications are invited from suitably qualified and registered Male or Female medical practitioners for the post of ASSISTANT MEDICAL OFFICER for general work in the Public Health Department. The duties of the appointment will include work in connection with immunisation and infectious diseases control, medical supervision of a long-stay children's home for tuberculosis contacts, and a certain number of maternity and child welfare clinic sessions. Opportunity will be given to the successful candidate to take the part-time D.P.H. Course at the Leeds University if it is so desired. The Medical Officer appointed will work under the immediate direction of the Medical Officer of Health and his Deputy. Salary scale £1050–£50 (3)–£1200–£55 (5)–£1475 p.a. In determining the commencing salary, due consideration will be given to previous experience and qualifications. The first increment will take effect on 1st April following the completion of 6 months satisfactory service. The person appointed will be required to pass a medical examination and to contribute to the superannuation fund established under the Local Government Superannuation Acts, 1937–53.

Applications, endorsed "Assistant Medical Officer," must be delivered at the Public Health Department, 25, East-parade, Leeds, 1, not later than 10 A.M. on Monday, 7th January, 1957. Canvassing in any form, either directly or indirectly, will be a disqualification. I. G. DAVIES, Medical Officer of Health.

NORTHAMPTONSHIRE. Applications are invited from registered medical practitioners holding a D.P.H. for the appointment of DISTRICT MEDICAL OFFICER OF HEALTH for the Borough of Daventry and the Rural Districts of Brixworth and Daventry and ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH for the same area. The Officer will act under the County Medical Officer of Health as Assistant County Medical Officer. The salary scales are: (i) for the post of Medical Officer of Health for the District Councils £920–£1030 p.a.; and (ii) Assistant County Medical Officer £656–£922 p.a. A travelling allowance will be paid on the scale from time to time approved by the County Council. Office accommodation and clerical assistance will be provided. The appointment is subject to: (*a*) the Local Government Act, 1933, and the Sanitary Officers (Outside London) Regulations, 1935 and 1951; (*b*) the Local Government Superannuation Acts; and (*c*) the passing of a medical examination. The Officer will be required to devote his whole time to the duties of the appointment, to reside within the area for which he acts, and to discharge the obligations imposed on a District Medical Officer of Health by the relevant Acts, Orders, and Regulations. As regards the duties of District Medical Officer of Health, the Officer will be subject to the control and direction of the several Councils. The appointment will be determinable upon 3 months notice on either side.

Applications, stating age, qualifications, and experience, with the names of 3 referees, should reach the Clerk of the County Council by 22nd December, 1956.

J. ALAN TURNER, Clerk of the County Council.
County Hall, Northampton.

ROTHERHAM. COUNTY BOROUGH OF ROTHERHAM. Applications are invited from registered medical practitioners (Male) for the post of DEPUTY MEDICAL OFFICER OF HEALTH AND DEPUTY PRINCIPAL SCHOOL MEDICAL OFFICER at a salary within the consolidated range of £1380–£55 (4)–£50 (1)–£1650. The commencing salary will be determined at a point within the scale, having regard to the experience of the successful candidate. Applicants must possess a D.P.H. and have had previous experience in school health, maternity and child welfare, and general public health work. The person appointed will be responsible, under the direction of the Medical Officer of Health, for carrying out administrative and other duties in all sections of the work of the Health Department, and must be capable of assuming full responsibility for the Department when necessary. The appointment is whole-time, and the successful candidate will not be allowed to engage in private practice. The appointment will be terminable at any time by 3 months notice in writing on either side and will be subject to the Medical Whitley Council's General Conditions of Service for Public Health Medical Officers. The appointment is also subject to the approval of the successful candidate by the Minister of Education under the School Health Service and Handicapped Pupils Regulations 1953. The successful candidate will be required to pass a medical examination for superannuation purposes. Housing accommodation is available if required.

Forms of application and further information may be obtained from the Medical Officer of Health, Municipal Offices, Rotherham, and must be returned to the undersigned, giving the names of 3 referees, and endorsed "Deputy Medical Officer of Health," by 2nd January, 1957. Canvassing of members of the Council, whether direct or indirect, will disqualify any candidate.

JOHN S. WALL, Town Clerk.
Municipal Offices, Rotherham.

KINGSTON UPON HULL. CITY AND COUNTY OF KINGSTON UPON HULL. Applications are invited from registered medical practitioners, preferably holding a Diploma in Public Health, for the appointment of ASSISTANT MEDICAL OFFICER for duties in the Maternity and Child Welfare, School Health and other Local Health Authority's Services. Salary scale £1050–£50(3)–£55(5)–£1475, plus essential user car allowance.

Particulars of the appointment and forms of application may be obtained from the Medical Officer of Health, Guildhall, Kingston upon Hull, to whom completed application forms must be returned not later than 7th January, 1957.

OLDHAM. COUNTY BOROUGH OF OLDHAM. Applications are invited from registered medical practitioners for the appointment of ASSISTANT MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER, which affords an excellent opportunity for obtaining experience in the Public Health and School Health Services. Salary £1050–£50–£1200–£55–£1475 p.a. The point of entry will be fixed according to qualifications and experience. The appointment is superannuable and subject to medical examination.

Applications, stating age, qualifications and experience, should be forwarded to the Medical Officer of Health, Public Health Department, Town Hall, Oldham, together with copies of 2 testimonials, or the names of 2 persons to whom reference may be made. EDWARD HAINES, Town Clerk.

General Practice

An Assistant is required with view to partnership in private practice in N.E. coast town.—Send application and names of 3 referees to: Address, No. 268, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Hospital Services: Non-Medical Appointments

OXFORD. UNITED OXFORD HOSPITALS. Department OF CLINICAL BIOCHEMISTRY, RADCLIFFE INFIRMARY, OXFORD. Applications invited for post of HOSPITAL BIOCHEMIST (Senior grade) in routine biochemical section of this department. Candidates must hold university degree in science or equivalent qualification. Salary and conditions of service in accordance with the Whitley scale. Details of post may be obtained from the Director of the Department.

Applications, with names and addresses of 2 referees, should be sent to the Administrator, Radcliffe Infirmary, Oxford, not later than 4th January, 1957.

Miscellaneous

Slough Industrial Health Service. Applications are invited for the post of Resident Assistant Medical Officer with effect from 1st January, 1957. The appointment is for 6 months. Candidates should be single, male, and have had experience in casualty work. Duties entail supervision of the emergency casualty service and the normal duties of an industrial medical officer. Salary £900 p.a. with full residential emoluments and car allowance of £150 p.a.

Applications should be submitted at once to the Medical Director, Slough Industrial Health Service, Farnham-road, Slough, with the names of 3 referees.

British Medical Adviser required by Ciba. Duties include initiation and development of clinical trials in the United Kingdom and general professional advisory work. Training in medical statistics an advantage. It is a permanent and progressive post with good contributory superannuation scheme. Candidates must have British qualifications, and should be preferably between 35 and 40 years of age and have had several years clinical experience. Salary not less than £1600 p.a.—Applications with particulars of qualifications and experience to Secretary, CIBA LABORATORIES LIMITED, Horsham, Sussex.

Medical Officer required urgently, exclusive service large firm Uganda. Preferably Diploma Public Health and/or Tropical Medicine. Minimum qualification registered U.K. for practising medicine and surgery. Minimum £1200 p.a.—Reply I. GUNDLE LTD., 2, Ellerdale-road, London, N.W.3.

Western Australia. Unopposed Seaside Country Town. Surgeon required as Partner (or Assistant with view). Modern hospital (40 Beds), theatre air-conditioned. Flying Doctor base hospital. Practice income (solo) £7500 last 3 years. Substantial increase likely with 2 doctors. Goodwill half-share £2500, terms. Salary while assistant £45 per week. Non-catholic preferred. Accommodation. Fishing, shooting, sunny climate. Vendor trained Middlesex Hospital, London.—Apply air-mail, age, experience, capital, &c. Address, No. 267, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Mission Hospital in Nigeria requires secondhand Clinical Laboratory Equipment. Details with prices to SUDAN UNITED MISSION, 112–114, Great Portland-street, London, W.1.

The British Journal of Medical Hypnotism. Quarterly, £1 1s. p.a.—Orders to the publishers, 4, Victoria-terrace, Hove, 3, Sussex.

"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimen of urine and £1 1s. fee. Haematology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1 (MUSeum 5386–7).

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE LTD., 98, Victoria-street, S.W.1 (Phone: VICtoria 0141), who are specialists in this kind of work.

Typewriting and Duplicating. First-class work at moder-ate prices by experienced medical typists. Electric machines.—SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM 5329/0504).

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